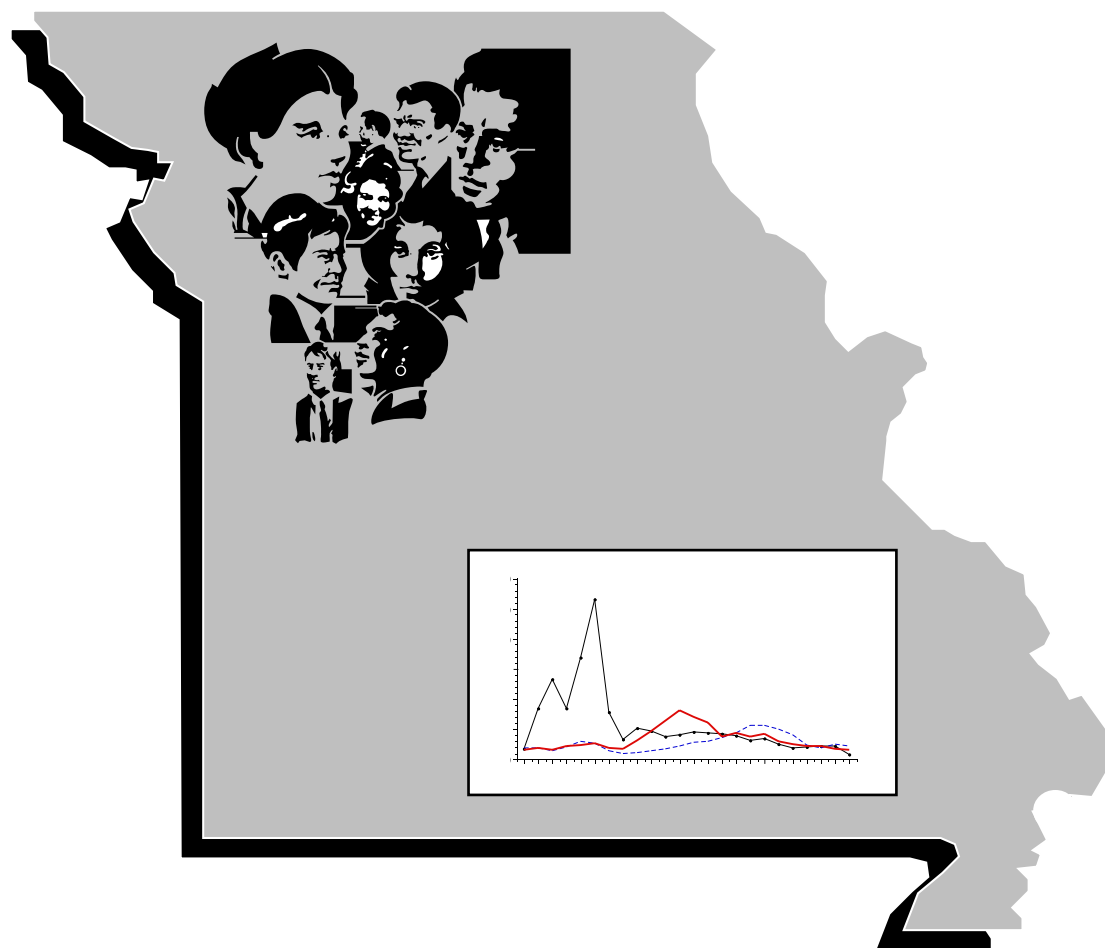


# Reportable Diseases in Missouri

# BIENNIAL REPORT 1990-91



Missouri Department of

# HEALTH



# Reportable Diseases in Missouri

Michael Carter, M.S.P.H.  
Intern, Summer of 1992

Mahree Skala, M.A.  
Chief, Bureau of Communicable Disease Control

H. Denny Donnell, Jr., M.D., M.P.H.  
Director, Office of Epidemiology

## **Contributors**

Tom Hicks, Chief  
Bureau of Immunization

Bill Huber, Chief  
Bureau of Sexually Transmitted Diseases

Ted Northup, Chief  
Bureau of AIDS Prevention

Bernard R. Malone, M.P.A., Interim Chief  
Victor Tomlinson, M.P.A., Chief  
Bureau of Tuberculosis Control

F. T. Satalowich, D.V.M., M.S.P.H., Chief  
Bureau of Veterinary Public Health

## **Production Manager**

Diane C. Rackers  
Office of Epidemiology

## **Under the Direction of**

Coleen Kivlahan, M.D., M.S.P.H.  
Director, Missouri Department of Health

William R. Schmidt, M.P.H., PA-C  
Director, Division of Environmental Health and Epidemiology

**Missouri Department of Health**  
**Jefferson City, Missouri**

Published January 1994

If you desire a copy of this publication in alternate form because of a disability,  
contact the Missouri Department of Health, Division of Administration, P.O. Box 570,  
Jefferson City, MO 65102, Phone (314) 751-6014.

Hearing-impaired citizens may contact the department by phone through  
Missouri Relay (800-725-2966).

# Table of Contents

Introduction .....	1
Map of Department of Health Districts .....	2
Department of Health Reporting Rules .....	3
Missouri's Selected Communicable Diseases - 15 Year Report .....	6
Diseases of the Gastrointestinal Tract	
Campylobacteriosis .....	7
Giardiasis .....	8
Salmonellosis .....	9
Shigellosis .....	10
Yersiniosis .....	11
Diseases of the Nervous System	
Aseptic Meningitis .....	13
Meningococcal Meningitis .....	14
Hepatitis	
Viral Hepatitis A .....	15
Viral Hepatitis B .....	16
Non-A Non-B Hepatitis .....	17
Immunizable Diseases	
Diphtheria .....	19
<i>Haemophilus influenzae</i> , type B .....	20
Influenza .....	21
Measles .....	22
Mumps .....	23
Pertussis .....	24
Poliomyelitis, Acute .....	25
Rubella .....	26
Sexually Transmitted Diseases	
<i>Chlamydia trachomatis</i> Infections .....	27
Genital Herpes .....	28
Gonococcal Pelvic Inflammatory Disease .....	28
Gonorrhea .....	29
HIV/AIDS .....	30
Non-gonococcal Urethritis .....	33
Penicillinase-producing <i>N. gonorrhea</i> .....	33
Syphilis .....	34

Tuberculosis .....	35
Zoonotic Diseases	
Animal Bites .....	37
Arthropod-borne Viral Encephalitides .....	37
Brucellosis .....	38
Ehrlichiosis .....	39
Histoplasmosis .....	40
Leptospirosis .....	41
Lyme Disease .....	42
Psittacosis .....	44
Rabies .....	45
Rocky Mountain Spotted Fever .....	46
Tularemia .....	47
Other Reportable Diseases .....	49
Diseases of Low Incidence .....	451

# Introduction

This is the first biennial report of the disease incidence data received by the Missouri Department of Health (DOH), Division of Environmental Health and Epidemiology in the decade of the nineties. It contains information about the reportable communicable diseases, including tuberculosis, AIDS and other sexually transmitted diseases. The information should be useful to health care professionals, public health professionals and policy-makers.

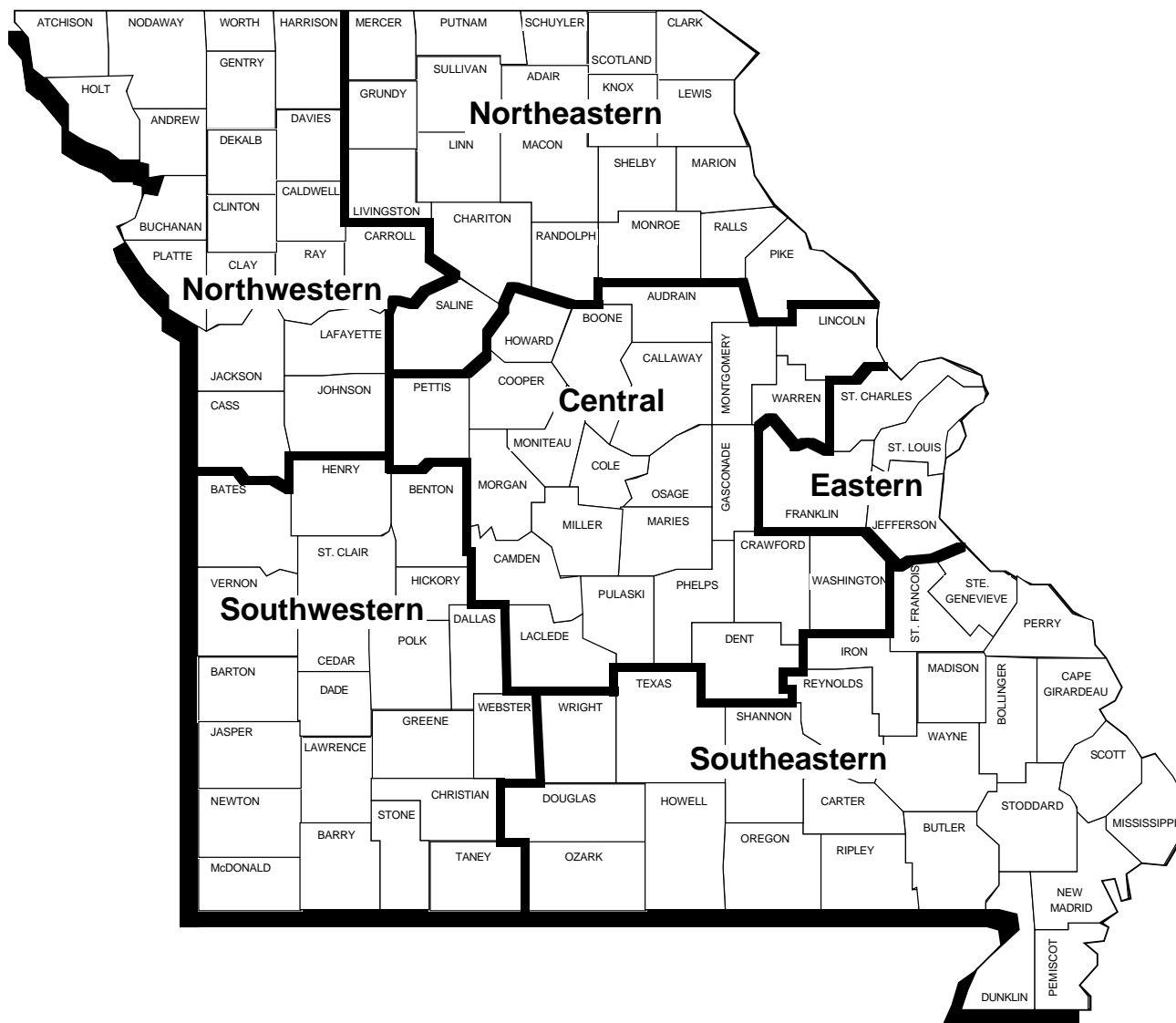
Each of the major diseases is presented with a brief introduction and summaries of the key statistics and changes from 1990–1991, supplemented by tables and graphs. To help put the disease trend into perspective, a graph is presented showing the trend for the 15-year period 1977–1991.

Reports of diseases of low incidence are provided in table form. A final table shows the data for conditions reported in large numbers through an active sentinel system that does not identify individuals and, in smaller numbers, through the passive surveillance system. Thus, some duplicate reports may be included.

Physicians and laboratories are required by law to report cases of diseases specified by the Department of Health. There is no mechanism for enforcement of this law and in practice the reporting is voluntary in Missouri as it is throughout the nation. Reports are routed in some cases through local health departments and in other cases directly to the state agency. Reports are evaluated in local health departments and by a network of DOH communicable disease coordinators in district offices to determine if they meet case definitions and to determine if follow-up or intervention is required.

The reported information is often supplemented by additional data collected by contacting the reporting source. Case reports of certain diseases are followed by local or DOH investigators to assure that patients receive appropriate treatment and that contacts are afforded the benefits of preventive measures and education. Examples of these diseases are tuberculosis, syphilis, HIV/AIDS, hepatitis, meningitis and measles. Reports of single cases or small numbers of unusual diseases may lead to discovery of outbreaks for which further investigation may stimulate specific recommendations for control measures to interrupt the transmission. Reports may identify groups at high risk, leading to targeted intervention efforts with those groups. Data also help in health planning, policy making and research.

# Department of Health Districts



**Central District Health Office**  
1001-A Southwest Boulevard  
Jefferson City, MO 65101  
(314) 751-4216

**Northwestern District Health Office**  
219 N. Chestnut, Box 230  
Cameron, MO 64429  
(816) 632-2107

**Eastern District Health Office**  
2 Campbell Plaza, 59th & Arsenal  
St. Louis, MO 63139  
(314) 781-7825

**Southeastern District Health Office**  
2875 James Boulevard  
Poplar Bluff, MO 63901  
(314) 840-9720

**Northeastern District Health Office**  
250 Patton, P.O. Box 309  
Macon, MO 63552  
(816) 385-3125

**Southwestern District Health Office**  
1414 West Elfindale, P.O. Box 777, MPO  
Springfield, MO 65801  
(417) 895-6900

# Department of Health Reporting Rules

## 19 CSR 20-20.020 Reporting Communicable, Environmental and Occupational Diseases

**PURPOSE:** *This rule designates the diseases, disabilities, conditions and findings that must be reported to the Department of Health. It also establishes when they must be reported.*

*Editor's Note: The secretary of state has determined that publication of this rule in its entirety would be unduly cumbersome or expensive. The entire text of the rule has been filed with the secretary of state. Section (3) (the only part of the rule not published in its entirety) names a publication in the **Federal Register** which has been filed with the secretary of state. The entire text of the rule is also available from the Department of Health, Division of Environmental Health and Epidemiology, and is available to any interested person at a cost not more than the actual cost of reproduction.*

(1) Category I diseases must be reported to the Department of Health or to the local health authority within twenty-four (24) hours of suspected diagnosis by telephone, telegraph or other rapid communication, followed by a written report within seven (7) days. Category I diseases are—

- Animal bites;
- Botulism;
- Chlamydia trachomatis infections;
- Diphtheria;
- Epidemics—foodborne, toxic substances and others;
- Gonorrhea;
- Hepatitis A;
- Invasive Hemophilus influenzae disease other than meningitis;
- Measles;
- Meningitis, Hemophilus influenzae;
- Meningitis, meningococcal;
- Poliomyelitis;
- Rabies;
- Rubella;
- Syphilis; and
- Typhoid fever.

(2) Category II diseases or findings shall be reported to the Department of Health or to the local health authority on forms provided by the Department of Health within seven (7) days of suspected or established diagnosis. Category II diseases or findings are—

- Acquired immune deficiency syndrome (AIDS);
- Amebiasis;
- Anthrax;

- Brucellosis;
- Campylobacter infections;
- Chancroid;
- Chickenpox, aggregate data only;
- Cholera;
- Disease due to mycobacteria other than tuberculosis (MOTT);
- E. coli* O157:H7;
- Encephalitis, post-infectious;
- Encephalitis, primary;
- Erythema infectiosum outbreaks;
- Genital herpes;
- Giardiasis;
- Granuloma inguinale;
- Hepatitis B and non-A, non-B;
- Histoplasmosis outbreaks;
- Human immunodeficiency virus (HIV) infection, confirmed;
- Influenza outbreaks;
- Kawasaki disease;
- Legionellosis;
- Leptospirosis;
- Listeria monocytogenes;
- Lyme disease;
- Lymphogranuloma venereum;
- Malaria;
- Meningitis, aseptic;
- Mumps;
- Nongonococcal urethritis;
- Nosocomial outbreaks;
- Pediculosis outbreaks;
- Pertussis;
- Plague;
- Psittacosis;
- Reye syndrome;
- Rheumatic fever, acute;
- Rocky Mountain spotted fever;
- Salmonella infections;
- Scabies outbreaks;
- Scarlet fever (scarlatina), aggregate data only;
- Shigella infections;
- Tetanus;
- T-Helper (CD4+) lymphocyte count on any person with HIV infection;
- Toxic shock syndrome;
- Trichinosis;
- Tuberculosis disease;
- Tuberculosis infection;
- Tularemia; and
- Yersinia enterocolitica*.

(3) Category III diseases or findings resulting from exposure to a toxic substance or to a radioactive substance that are indicative of a public health, occupational health, or environmental problem shall be reported to the Department of Health or the local health authority within twenty-four (24) hours of suspected or established diagnosis by telephone, telegraph or other rapid communication followed by a written report within seven (7) days. Category III diseases or findings are—

- Acute chemical poisoning as defined in 56 FR 52166-75;
- Carbon monoxide poisoning;
- Hyperthermia;
- Hypothermia;
- Methemoglobinemia; and
- Pesticide poisoning.

(4) Category IV diseases or findings resulting from exposure to a toxic substance or to a radioactive substance that are indicative of a public health, occupational health or environmental problem shall be reported to the Department of Health or to the local health authority on forms provided by the Department of Health within seven (7) days of suspected or established diagnosis. Category IV diseases or findings are—

- Lead exposure greater than or equal to ten micrograms per deciliter ( $\geq 10 \mu\text{g/dl}$ ) in persons under age eighteen ( $< 18$ ) or greater than or equal to twenty-five micrograms per deciliter ( $\geq 25 \mu\text{g/dl}$ ) in persons age eighteen or greater ( $\geq 18$ );
- Occupational lung diseases including silicosis, asbestosis, byssinosis, farmer's lung and toxic organic dust syndrome;
- Other heavy metal poisoning including mercury, arsenic and cadmium; and
- Respiratory diseases triggered by environmental factors including environmentally or occupationally induced asthma and bronchitis.

(5) The occurrence of epidemics or outbreaks of any illness or disease which may be of public health concern, including any illness in a food handler that is potentially transmissible through food, shall be reported to the Department of Health or the local health authority by telephone, telegraph or other rapid communication within twenty-four (24) hours of suspected diagnosis followed by a written report within seven (7) days.

(6) A physician attending any person who is suffering from any disease, condition or finding listed in sections (1)–(5) of this rule, or who is suspected of having any of those diseases, conditions or findings or who is suspected of being a carrier

of any of those diseases, conditions or findings shall report to the Department of Health or the local health authority within the specified time that person's name, address, age, sex, race, name of disease, condition or finding diagnosed or suspected and the date of onset of the illness.

(A) A physician attending any patient, with any disease, condition or finding listed in sections (1)–(5) of this rule, who is in a hospital, clinic or other private or public institution may authorize, in writing, the chief executive officer or designee of the hospital, clinic or institution to submit reports of reportable diseases or findings on patients attended by the physician at the hospital, clinic or institution. But under no other circumstances shall the physician be relieved of this reporting responsibility. Each report shall include the name, age, sex, race and the address of the patient, the disease or finding diagnosed or suspected, the date of onset of illness and whether the patient is hospitalized. If the patient is hospitalized, the name and address of the hospital, date of report, the name and address of the attending physician and any appropriate laboratory results must be included in the report.

(B) A physician's report of epidemics as required in section (5) of this rule shall include the diagnosis or principal symptoms, the approximate number of cases, the local health authority jurisdiction within which the cases occurred and the name and address of the reporting physician.

(7) Any person in charge of a public or private school, summer camp or day care center immediately shall report to the local health authority the presence or suspected presence of any diseases or findings listed in sections (1)–(5) of this rule.

(8) All local health authorities shall forward to the Department of Health reports of all diseases or findings listed in sections (1)–(5) of this rule. All reports shall be forwarded within twenty-four (24) hours after being received, according to procedures established by the Department of Health director. The local health authority shall transcribe from the original report any information necessary to carry out the required duties in 19 CSR 20-20.040 (2), (3) and (3)(A).

(9) All individual morbidity reports received by a local health authority or the Department of Health are to be considered confidential records and not public records.

*Auth: sections 192.005.2 and 192.020, RSMo (1986). \* This rule was previously filed as 13 CSR 50-101.020. Original rule filed July 15, 1948, effective Sept. 13, 1948. Amended: Filed Sept. 1, 1981, effective Dec. 11, 1981. Rescinded and readopted: Filed Nov. 23, 1982, effective March 11, 1983.*



*Emergency amendment filed June 10, 1983, effective June 20, 1983., expired Sept. 10, 1983. Amended: Filed June 10, 1983, effective Sept. 11, 1983. Amended: Filed Nov. 4, 1985, effective March 24, 1986. Amended: Filed Aug. 4, 1986, effective Oct. 11, 1986. Amended: Filed June 3, 1987, effective Oct. 25, 1987. Emergency amendment filed June 16, 1989, effective June 26, 1989, expired Oct. 23, 1989. Amended: Filed July 18, 1989, effective Sept. 28, 1989. Amended: Filed Nov. 2, 1990, effective March 14, 1991. Emergency amendment filed Oct. 2, 1991, effective Oct. 12, 1991, expired Feb. 8, 1992. Amended: Filed Oct. 2, 1991, effective Feb. 6, 1992. Amended: Filed Jan. 31, 1992, effective June 25, 1992. Amended: Filed Aug. 14, 1992, effective April 8, 1993.*

*\*Original authority: 192.005.2, RSMo (1985) and 192.020, RSMo (1939), amended 1945, 1951.*

## 19 CSR 20-20.080 Duties of Laboratories

**PURPOSE:** *This rule establishes the responsibility of laboratories to report to the Missouri Department of Health the results of all positive tests for specified diseases.*

(1) The director or person in charge of any laboratory shall report to the local health authority or the Missouri Department of Health the result of any test that is positive for, or suggestive of, any disease listed in 19 CSR 20-20.020. These reports shall be made according to the time and manner specified for each disease or condition following completion of the test and shall designate the test performed, the results of test, the name and address of the attending physician, the name of the disease or condition diagnosed or suspected, the date the test results were obtained, the name of the patient and the patient's age, sex and race.

(2) In reporting findings for Category III and Category IV diseases listed in 19 CSR 20-20.020(3) and (4), laboratories shall report—

- Blood or serum chemical/pesticide level greater than the Lowest Quantifiable Limit;
- Blood lead level greater than or equal to ten micrograms per deciliter ( $\geq 10$   $\mu\text{g/dl}$ ) in persons under age eighteen ( $< 18$ ) or greater than or equal to twenty-five micrograms per deciliter ( $\geq 25$   $\mu\text{g/dl}$ ) in persons age eighteen or greater ( $\geq 18$ );
- Blood mercury level greater than or equal to three-tenths micrograms per deciliter ( $\geq 0.3$   $\mu\text{g/dl}$ );
- Carboxyhemoglobin level greater than fifteen percent (15%);
- Urinary arsenic level greater than or equal to one hundred micrograms per liter ( $\geq 100$   $\mu\text{g/l}$ );
- Urinary cadmium level greater than or equal to one microgram per liter ( $\geq 1.0$   $\mu\text{g/l}$ ); and
- Urinary mercury level greater than or equal to twenty micrograms per liter ( $\geq 20$   $\mu\text{g/l}$ ).

*Auth: sections 192.005.2 and 192.020, RSMo (1986). \* This rule was previously filed as 13 CSR 50-101.090. Original rule filed July 15, 1948, effective Sept. 13, 1948. Amended: Filed Aug. 4, 1986, effective Oct. 11, 1986. Amended: Filed Aug. 14, 1992, effective April 8, 1993.*

*\*Original authority: 192.005.2, RSMo (1985) and 192.020, RSMo (1939) amended 1945, 1951.*

# Missouri Morbidity and Mortality Reports of Selected Communicable Diseases - 15 Year Report

	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979	1978	1977
AIDS	656	599	481	403	239	91	52	28	6	1	-	-	-	-	-
Amebiasis	25	26	19	30	27	26	28	44	45	11	28	15	29	20	10
Brucellosis	3	1	2	4	14	4	12	7	4	4	4	3	6	3	9
Campylobacter	602	547	473	441	260	281	304	260	166	115	78	49	-	-	-
Chickenpox	7678	10591	9086	11350	8595	5093	2474	2565	408	637	880	2331	3510	4048	4246
Chlamydia	10643	11151	8151	6239	2944	1532	412	9	-	-	-	-	-	-	-
Encephalitis, Inf.	22	12	6	8	11	13	12	11	28	16	10	13	16	16	11
Giardiasis	790	878	859	654	690	516	458	462	216	235	113	77	72	-	-
Gonorrhea	17450	20012	21053	17241	16491	19029	20023	20042	20750	21269	22249	21640	21395	23029	21126
Haemophilus influenzae type B															
Meningitis	42	88	106	138	131	172	108	104	86	66	-	-	-	-	-
Other Invasive	39	57	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	653	619	810	897	560	126	98	138	123	204	282	254	392	552	504
Hepatitis B	549	633	704	639	460	420	359	297	365	297	307	205	267	231	233
Non A, Non B	31	42	53	50	46	39	42	18	33	24	(These years are added into Hepatitis Unspec)				
Unspecified	15	19	13	21	21	15	24	46	87	95	214	176	189	192	205
Influenza (confirmed)	462	220	293	148	69	78	61	39	140	153	225	-	-	-	-
Lyme Disease	207	205	108	-	-	-	-	-	-	-	-	-	-	-	-
Malaria	9	13	13	6	8	12	5	8	4	10	4	16	6	10	23
Meningitis, Asep.	277	246	223	124	163	172	156	95	277	156	178	116	130	-	-
Meningitis, Mening.	37	31	21	33	35	40	46	53	55	40	45	42	38	42	29
Meningitis, Other	62	66	64	64	75	123	47	51	276	156	122	127	94	92	89
Mumps	40	62	87	68	38	23	18	11	21	13	40	103	203	1211	2421
Pertussis	83	116	141	25	46	32	35	23	24	17	24	30	24	45	31
Polio, all forms	0	0	0	1	0	0	1	0	2	0	1	0	1	0	0
Rabies, Animal	28	30	62	36	59	75	59	70	96	123	243	379	307	95	60
RMSF	25	36	48	54	26	25	10	14	14	10	23	31	31	29	19
Rubella	5	3	4	0	0	1	7	0	0	38	2	45	73	118	93
Rubeola	1	103	671	65	190	32	5	6	1	2	1	67	436	154	1055
Salmonellosis	616	723	676	772	660	728	690	617	602	571	700	589	602	488	418
Shigellosis	259	284	411	607	471	89	143	244	264	67	268	129	258	443	406
Syphilis, Total	926	598	388	473	328	494	578	712	801	1069	1397	1051	896	1573	1728
Primary & Second.	572	272	162	154	90	110	133	186	145	296	394	163	139	144	172
Tetanus	1	0	4	1	1	2	3	6	1	1	1	2	1	2	4
Tuberculosis	254	312	278	275	339	338	311	354	399	390	432	466	500	456	497
Tularemia	44	33	39	45	58	32	35	40	51	27	28	26	21	21	26
Typhoid Fever	2	4	2	3	7	6	6	6	10	4	9	20	8	7	14
Yersinia enterocolitica	48	32	36	30	10	6	2	3	1	-	-	-	-	-	-

# Diseases of the Gastrointestinal Tract

## Campylobacteriosis (*Campylobacter enteritis*)

Campylobacteriosis is an acute enteric disease of bacterial origin. The disease is characterized by bloody and mucoid diarrhea, abdominal cramps, fever, nausea and vomiting. The primary mode of transmission for this disease is through consumption of inadequately cooked foods of animal origin, including poultry, beef, pork and unpasteurized milk. This disease can be acquired by individuals who are exposed to animals and animal products, such as veterinarians, farmers and food processing workers.

In Missouri, there were 547 cases of campylobacteriosis in 1990 and 602 cases in 1991. The number of cases has increased annually since 1987. See Figure 1. The highest incidence occurred in those less than five years of age, with incidence rates of 30.3 per 100,000 in 1990 and 27.3 per 100,000 in 1991. See Figure 2. The geographic distribution of campylobacteriosis by Department of Health districts is shown in Figure 3. Among the reported cases, 296 (25.8%) were hospitalized and there was one death for a case fatality rate of 0.87 per 1,000.

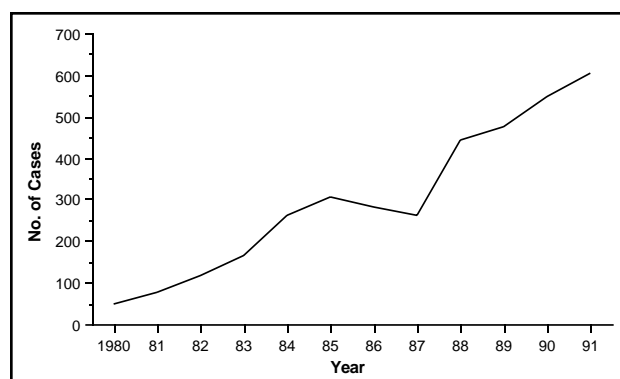


Figure 1. Campylobacteriosis cases by year, Missouri, 1980-91

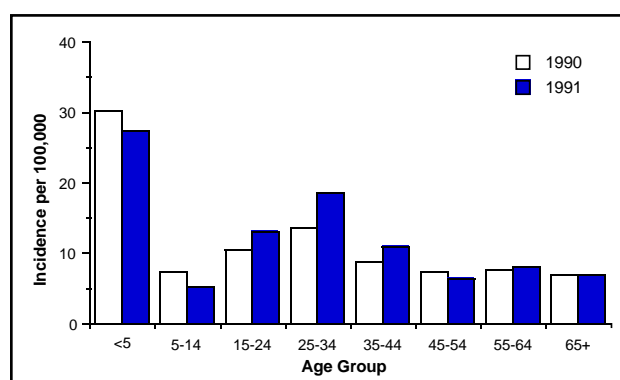


Figure 2. Campylobacteriosis incidence by age group, Missouri, 1990-91

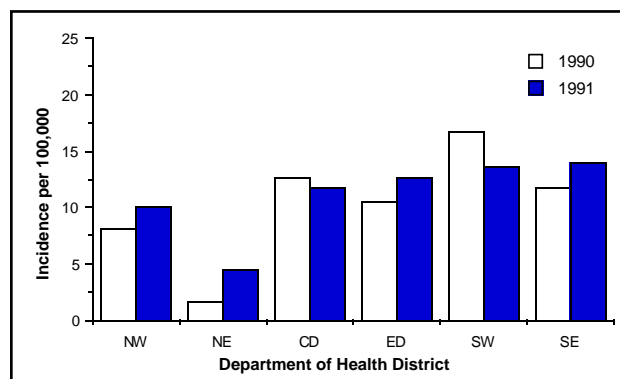


Figure 3. Campylobacteriosis incidence by health district, Missouri, 1990-91

## Giardiasis (*Giardia enteritis*)

Giardiasis is usually a mild intestinal disease caused by a protozoan flagellate, *Giardia lamblia*. This protozoan infects the upper small intestine and usually does not produce symptoms. It is sometimes associated with symptoms such as chronic diarrhea, abdominal cramps, bloating, steatorrhea, fatigue and weight loss. The parasite can be passed from person to person by the fecal-oral route or through contaminated food and water.

In Missouri, there were 878 cases of giardiasis reported in 1990 and 790 cases in 1991. The number of cases seen annually has increased relatively steady since giardiasis became reportable in 1979. See Figure 1. Presently, this disease affects primarily the younger population. The highest incidence occurred in those less than five years of age, with incidence rates of 88.3 per 100,000 in 1990 and 83.4 per 100,000 in 1991. See Figure 2. The geographic distribution by Department of Health districts in Missouri is shown in Figure 3.

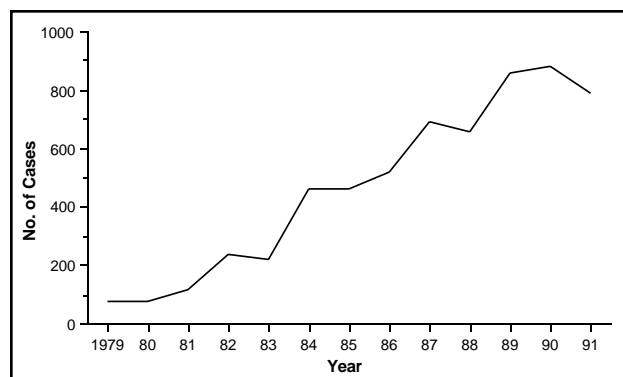


Figure 1. Giardiasis cases by year, Missouri, 1979-91

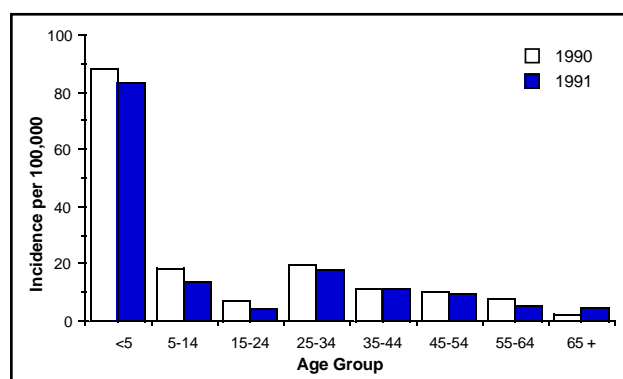


Figure 2. Giardiasis incidence by age group, Missouri, 1990-91

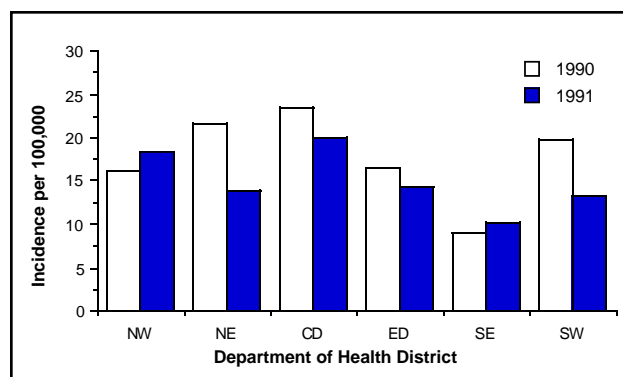


Figure 3. Giardiasis incidence by health district, Missouri, 1990-91

## Salmonellosis

Salmonellosis is a bacterial infection that can be caused by a variety of *Salmonella* organisms. The genus *Salmonellae* includes over 2,000 serotypes. Each serotype has its own antigenic composition and usual host range. Salmonellosis manifests with the following symptoms: acute enterocolitis, abdominal pain, diarrhea, vomiting, nausea and anorexia. Symptoms may be mild and infections may occur without symptoms. Deaths associated with salmonellosis are rare, but the morbidity and the associated costs of this disease are high. There is regional variation in the prevalence of the different serotypes; *S. enteritidis* and *S. typhimurium* are the two most commonly reported serotypes in the United States.

Transmission of *Salmonella* organisms occurs through infected food animals or fecal contamination of food. These food items include poultry, meat and meat products, raw and undercooked eggs and egg products, raw milk and raw milk products, as well as pet turtles and chicks and unsterilized pharmaceuticals of animal origin.

In Missouri, there were 723 cases of salmonellosis reported in 1990 and 616 cases in 1991. Annual incidence has been in the range of 570–770 cases since 1979. Those less than five years of age had the highest rate of *Salmonella* infection, with incidence rates of 56.1 per 100,000 in 1990 and 37.4 per 100,000 in 1991. See Figure 2. The Southwestern health district had the highest incidence in 1990 with a rate of 24.6 per 100,000 and the Southeastern district had the highest incidence in 1991 with a rate of 19.4 per 100,000. See Figure 3. The most common serotypes isolated in Missouri in 1990–91 are shown in Figure 4. Among the reported cases, 389 (29.1%) were hospitalized and there were seven deaths for a case fatality rate of 5.2 per 1,000.

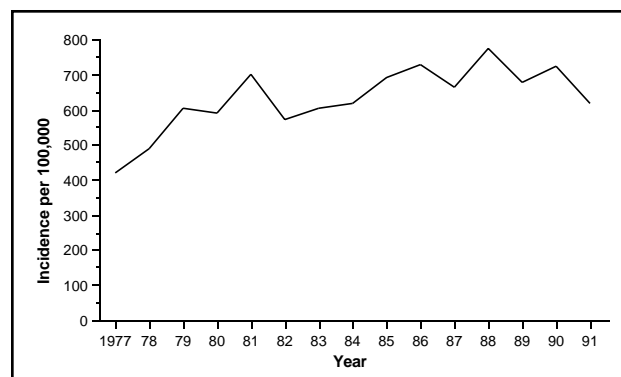


Figure 1. Salmonellosis cases by year, Missouri, 1977–91

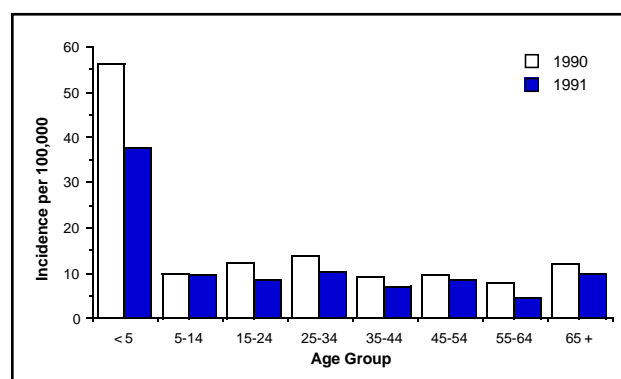


Figure 2. Salmonellosis incidence by age group, Missouri, 1990–91

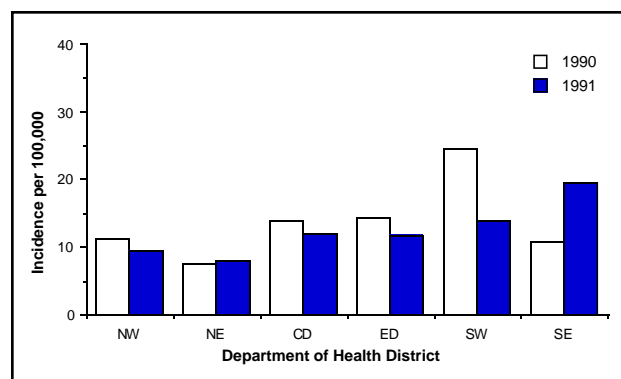


Figure 3. Salmonellosis incidence by health district, Missouri, 1990–91

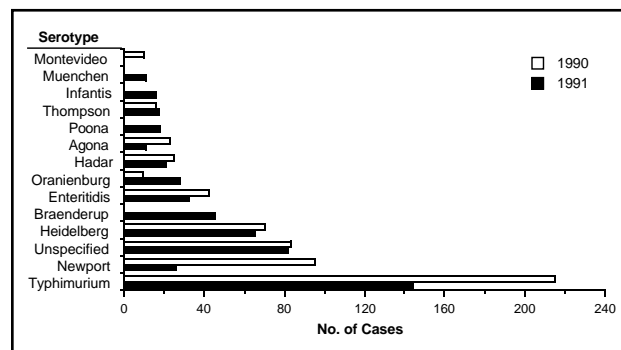


Figure 4. *Salmonella* serotypes in Missouri, 1990–91

## Shigellosis (Bacillary dysentery)

Shigellosis is a bacterial enteric disease transmitted among humans. The disease causes diarrhea, fever, vomiting, nausea and abdominal cramps. There may be mild and even asymptomatic cases. The usual means of transmission is by direct or indirect fecal-oral contamination from a patient or carrier. Poor hygienic practices such as failure to wash hands and clean under fingernails following defecation are a major risk for transmission. The disease is more severe in children, elderly adults and debilitated individuals.

The number of cases of shigellosis in Missouri has been on the decline for the past three years. In 1991, the number of reported cases dropped to 259. See Figure 1. The highest incidence occurred in those less than five years of age, with incidence rates of 27.1 per 100,000 in 1990 and 30.5 per 100,000 in 1991. See Figure 2. The Central health district had the highest incidence in 1990 with a rate of 8.72 per 100,000 and the Northwestern health district had the highest incidence in 1991 with a rate of 11.0 per 100,000. See Figure 3. Among the reported cases, 114 (21.0%) were hospitalized. There were no deaths.

There are four species of *Shigella* with many serotypes. Table 1 shows the isolations made in Missouri.

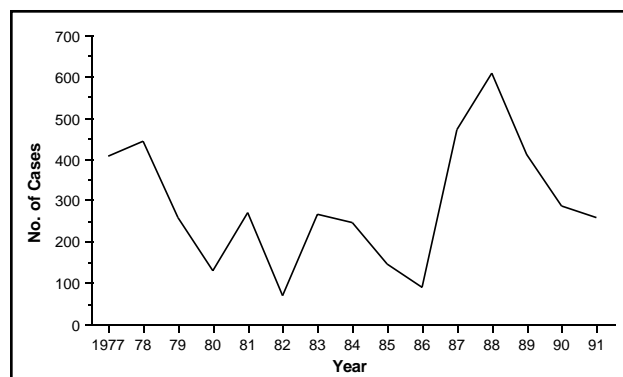


Figure 1. Shigellosis cases by year, Missouri, 1977-91

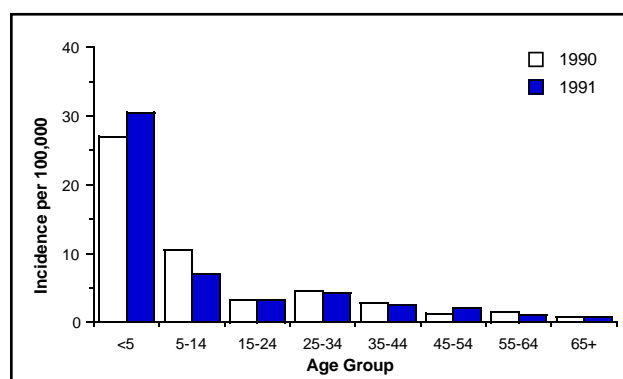


Figure 2. Shigellosis incidence by age group, Missouri, 1990-91

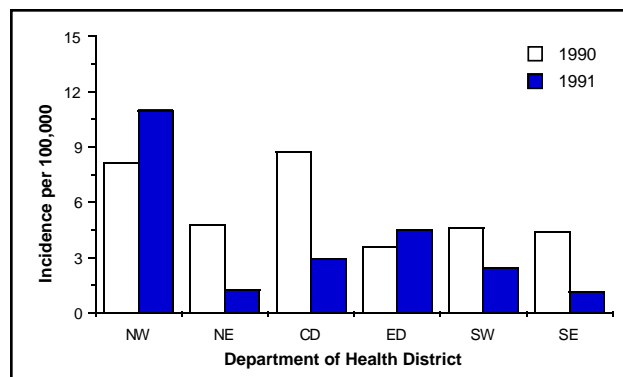


Figure 3. Shigellosis incidence by health district, Missouri, 1990-91

Table 1. *Shigella* species in Missouri, 1990-91

Serotype	1990	1991
<i>S. sonnei</i>	220 (77.5%)	168 (64.9%)
<i>S. flexneri</i>	26 (9.2%)	18 (6.9%)
<i>S. dysenteriae</i>	0	1 (0.4%)
<i>S. boydii</i>	0	3 (1.2%)
Unspecified	38 (13.4%)	69 (26.6%)

## Yersiniosis (*Yersinia enterocolitica*)

Yersiniosis is an acute bacterial enteric disease which is manifested by the following signs and symptoms: acute watery diarrhea (especially in young children), enterocolitis, fever and vomiting. Less common symptoms include erythema nodosum, cutaneous ulcerations, osteomyelitis and septicemia. The *Yersinia* genus includes *Y. pestis*, the agent of plague, and numerous others most of which are not pathogenic.

*Yersinia enterocolitica* is reportable in Missouri and presents most commonly with a gastro-enterocolitis syndrome. There are over 50 serotypes and five biotypes of *Y. enterocolitica*, many of which are non-pathogenic.

The pig is the principal reservoir of pathogenic *Y. enterocolitica*. Fecal-oral transmission occurs when contaminated food and drinks are consumed or contact occurs with an infected person or animal. Although *Y. enterocolitica* has been isolated from a variety of foods, the pathogenic strains are most commonly isolated from raw pork products. Because of its ability to grow and multiply in refrigerated and microaerophilic conditions, there is an increased risk of infection if uncured meat is stored undercooked.

In Missouri, the number of reported cases of yersiniosis has steadily increased each year since becoming reportable in 1983, with 32 cases reported in 1990 and 48 cases in 1991. See Figure 1. The highest incidence occurred in those under five years of age, with incidence rates of 4.87 per 100,000 in 1990 and 7.06 per 100,000 in 1991. The incidence for this age group is four to seven times higher than any other age group. See Figure 2. The Eastern health district, which includes St. Louis, had the highest incidence in 1991 with a rate of 1.67 per 100,000. See Figure 3. This may be due to the number of African-Americans of southern

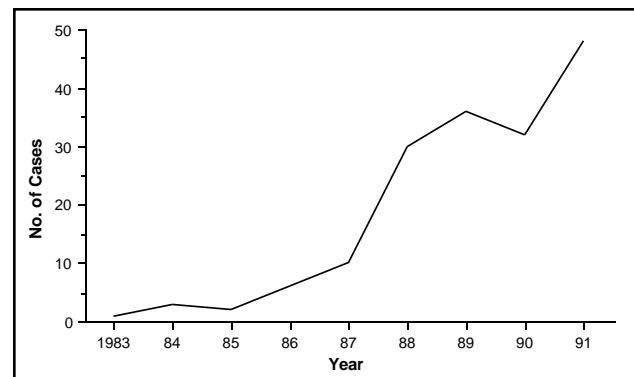


Figure 1. Yersiniosis cases by year, Missouri, 1983-91

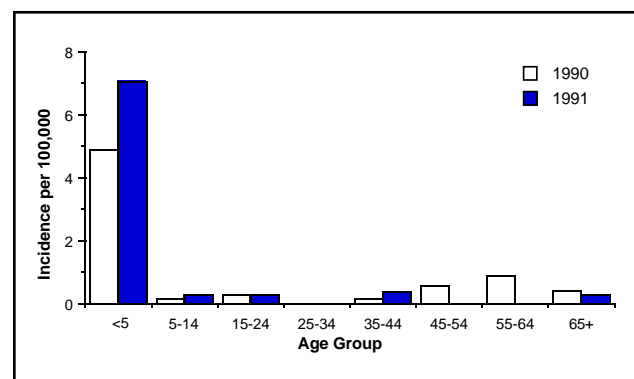


Figure 2. Yersiniosis incidence by age group, Missouri, 1990-91

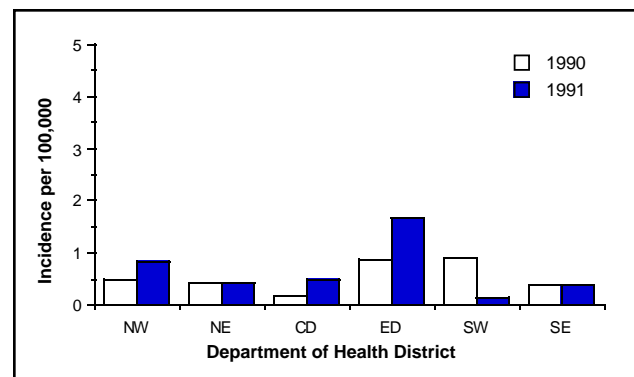


Figure 3. Yersiniosis incidence by health district, Missouri, 1990-91

origin who eat pork dishes such as chitterlings during holiday seasons. Among the reported cases, 29 (36.3%) were hospitalized and there was one death for a case fatality rate of 12.5 per 1,000.





# Diseases of the Nervous System

## Aseptic Meningitis (Viral meningitis, non-bacterial meningitis)

This a common but rarely serious disease syndrome with multiple etiologies of viral origin. The disease is characterized by the sudden onset of fever with signs of meningeal involvement, and laboratory findings of pleocytosis, increased levels of protein, normal sugar and the absence of bacteria in the cerebrospinal fluid.

In the United States, the majority of cases of aseptic meningitis is caused by enteroviruses (picornavirus). The incidence of specific types of viruses varies with geographic location and time.

In Missouri, there has been an increasing number of cases of aseptic meningitis over the past three years, with 246 cases reported in 1990 and 277 cases in 1991. See Figure 1. The highest incidence occurred in those less than five years of age, with incidence rates of 20.0 per 100,000 in 1990 and 18.3 per 100,000 in 1991. See Figure 2. The Southwestern health district had the highest incidence, with incidence rates of 9.14 per 100,000 in 1990 and 8.39 per 100,000 in 1991. See Figure 3. Among the reported cases, 494 (94.5%) were hospitalized and there were six deaths for a case fatality rate of 11.5 per 1,000.

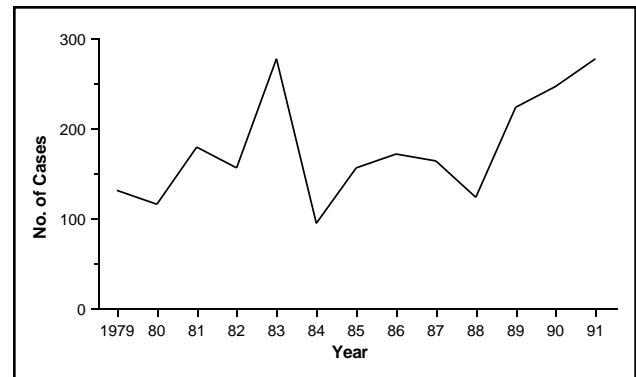


Figure 1. Aseptic meningitis cases by year, Missouri, 1979-91

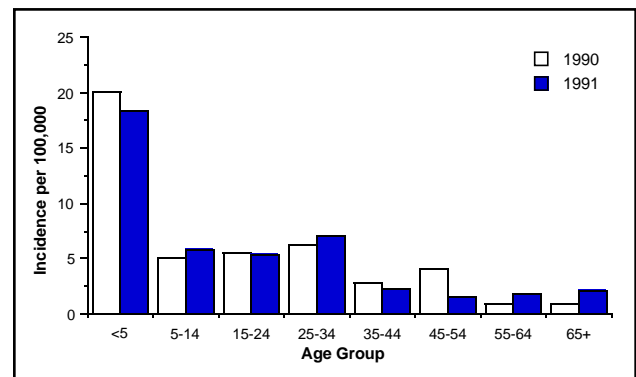


Figure 2. Aseptic meningitis incidence by age group, Missouri, 1990-91

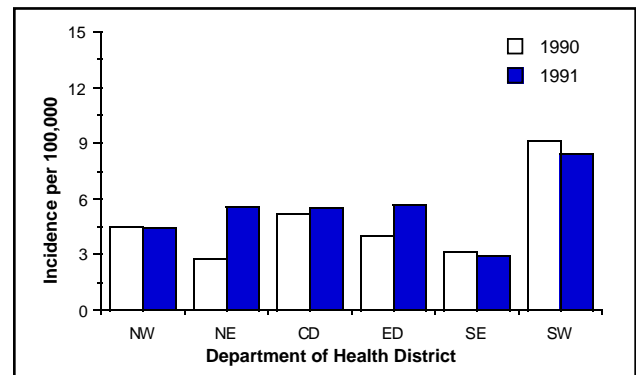


Figure 3. Aseptic meningitis incidence by health district, Missouri, 1990-91

## Meningococcal Meningitis

Meningococcal meningitis is an acute bacterial disease characterized by sudden onset of fever, severe headaches, nausea and vomiting, stiff neck, petechial rash, delirium and coma.

The infectious agent is *Neisseria meningitidis*. Asymptomatic carriage of this organism is relatively common. Transmission of the organism occurs by direct contact, including respiratory droplets from the nose and throat. The incubation period is usually two to ten days. Susceptibility to this disease decreases with age. Individuals lacking certain complement components are at risk to contract or have recurrence of this disease.

In Missouri, there were 37 cases of meningococcal meningitis reported in 1991, up from 31 cases reported in 1990. The trend for this disease has been variable over the past 15 years with an average of 33 cases per year being reported in the state. See Figure 1.

The highest incidence occurred in those less than five years of age, with incidence rates of 2.7 per 100,000 in 1990 and 3.0 per 100,000 in 1991. See Figure 2.

Among the reported cases, 63 (92.6%) were hospitalized and there were six deaths for a case fatality rate of 88.2 per 1,000.

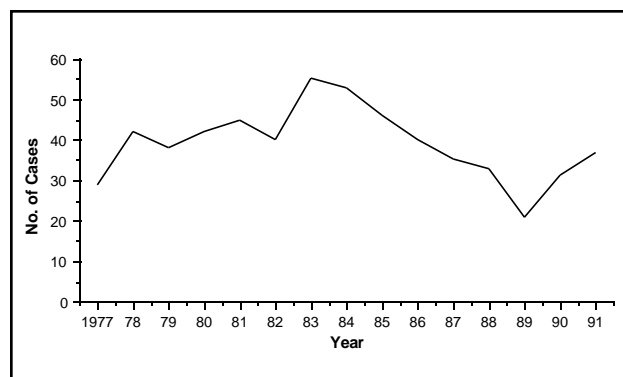


Figure 1. Meningococcal meningitis cases by year, Missouri, 1977-91

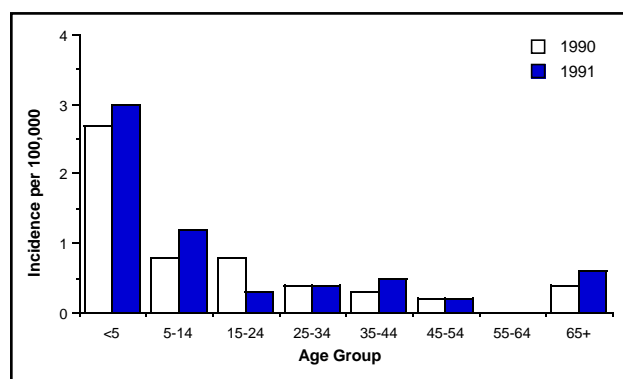


Figure 2. Meningococcal meningitis incidence by age group, Missouri, 1990-91

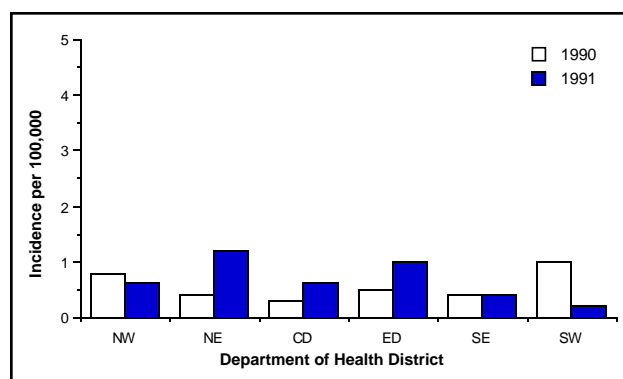


Figure 3. Meningococcal meningitis incidence by health district, Missouri, 1990-91

# Hepatitis

## Viral Hepatitis

Viral hepatitis is a collective term used to describe inflammation of the liver resulting from viral infection. Presently, there are four different types of viral hepatitis recognized in the United States: A, B, C and D. Although the symptoms of hepatitis are similar, they differ in etiology and in immunologic, pathologic and epidemiologic characteristics.

### Viral Hepatitis A

(Infectious Hepatitis, Epidemic Hepatitis, Epidemic Jaundice, Type A Hepatitis, HAV)

Of all the forms of viral hepatitis present in the United States, hepatitis A is the only one that is transmitted by the fecal-oral route. The infectious agent is found in stool, reaching peak levels one to two weeks prior to the onset of symptoms. Infectivity declines when symptoms of liver dysfunction appear (i.e., jaundice). The usual mode of transmission is through direct contact with an infected person, including sexual contact. Common-source outbreaks have been attributed to contaminated water, food contaminated by infected food-handlers and raw or uncooked shellfish harvested from contaminated waters. The incubation period is approximately two to seven weeks.

Symptoms include fever, malaise, anorexia, nausea, abdominal discomfort and jaundice. The disease varies in severity from mild illness lasting one to two weeks to a severe and disabling illness lasting several months. Asymptomatic infection is common and is inversely related to age.

In 1990, there were 619 cases of hepatitis A, an incidence rate of 12.1 per 100,000. In 1991, there was a five percent increase in the number of cases as the statewide total reached 653 cases and an incidence rate of 12.8 per 100,000. See Figure 1. The highest incidence occurred in the 25–34 year age group, with incidence rates of 24.7 per 100,000 in 1990 and 24.2 per 100,000 in 1991. See Fig-

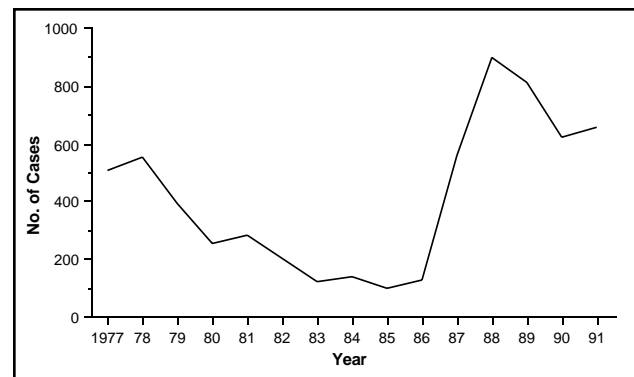


Figure 1. Hepatitis A cases by year, Missouri, 1977–91

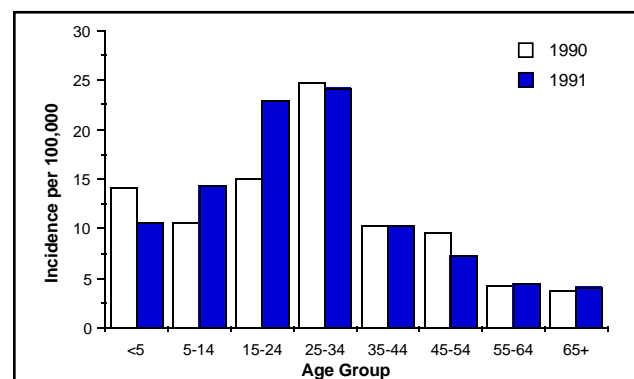


Figure 2. Hepatitis A incidence by age group, Missouri, 1990–91

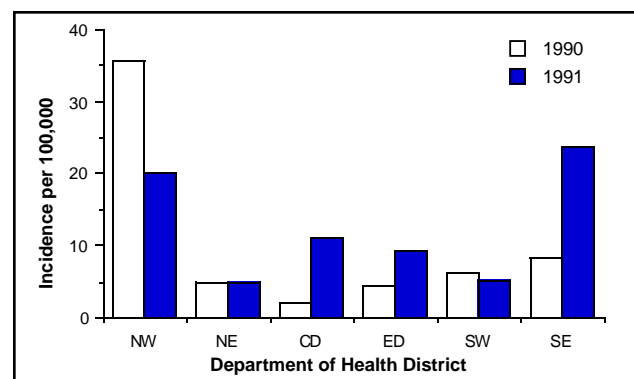


Figure 3. Hepatitis A incidence by health district, Missouri, 1990–91

ure 2. The Northwestern health district had the highest incidence in 1990 with a rate of 35.5 per 100,000, while the Southeastern health district reported the highest incidence in 1991 with a rate of 23.8 per 100,000. See Figure 3. Among the reported cases, 265 (20.8%) were hospitalized and there were seven deaths for a case fatality rate of 5.5 per 1,000.

## Viral Hepatitis B (Type B Hepatitis, Serum Hepatitis, HBV)

Hepatitis B is the most common form of bloodborne hepatitis. The virus is transmitted via direct contact with infectious blood and body fluids. The hepatitis B antigen is found in virtually all body secretions and excretions, however, only blood, saliva, semen and vaginal fluids have been shown to be infectious. Infection can occur through sexual contact, IV drug use, occupational exposure in healthcare settings and perinatal exposure.

In Missouri, there were 633 acute cases of hepatitis B reported in 1990 and 549 acute cases reported in 1991, a statewide decrease of 13.3 percent. See Figure 1. The highest incidence occurred in the 25-34 year age group, with an incidence rate of 25.6 per 100,000 in 1990 and 1991. See Figure 2. The Northwestern health district had the highest incidence with rates of 16.5 per 100,000 in 1990 and 14.0 per 100,000 in 1991. See Figure 3. Among the reported cases, 234 (19.8%) were hospitalized and there were ten deaths for a case fatality rate of 8.5 per 1,000.

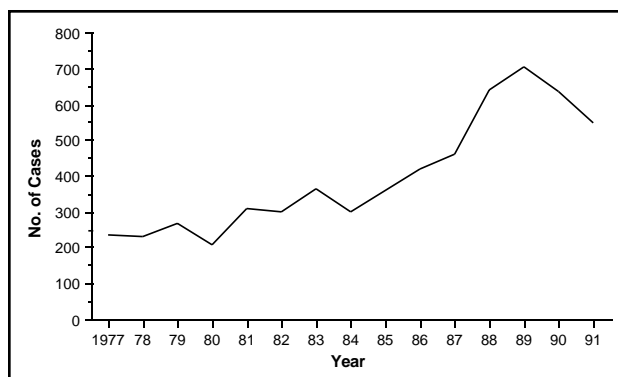


Figure 1. Hepatitis B cases by year, Missouri, 1977-91

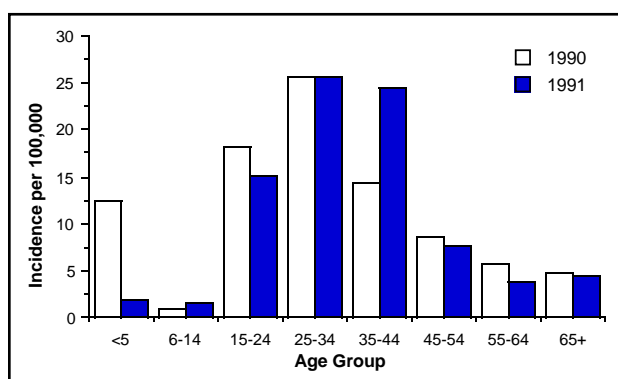


Figure 2. Hepatitis B incidence by age group, Missouri, 1990-91

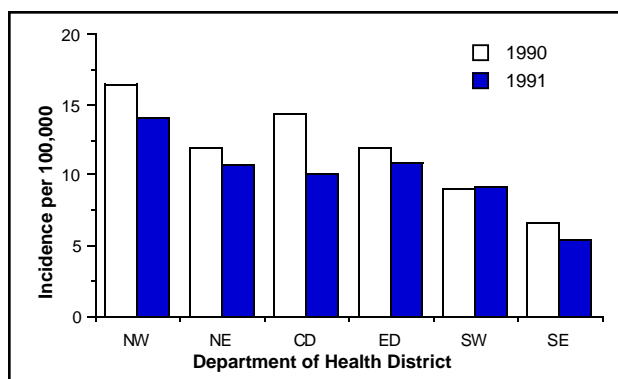


Figure 3. Hepatitis B incidence by health district, Missouri, 1990-91

## Non-A Non-B Hepatitis (NANB)

Non-A Non-B (NANB) hepatitis is a diagnosis of exclusion. Most NANB hepatitis in the United States is probably caused by the recently described hepatitis C virus; an unknown proportion may be due to other agents. NANB hepatitis includes both transfusion-associated disease, 90 percent of which is caused by the hepatitis C virus, and community-acquired disease. The newly developed serologic tests for hepatitis C antibodies are not helpful in diagnosing acute disease because there is a prolonged interval between disease onset and detection of antibodies. The diagnosis of acute NANB hepatitis, therefore, still relies on testing to rule out hepatitis A and B.

In Missouri, there were 42 cases of NANB hepatitis reported in 1990 and 31 cases reported in 1991. See Figure 1. The highest incidence occurred in the 35–44 year age group in 1990, with an incidence rate of 2.5 per 100,000. In 1991, the highest incidence occurred in the 25–34 year age group, with an incidence rate of 1.4 per 100,000. The Northwestern health district had the highest incidence, with incidence rates of 1.4 per 100,000 in 1990 and 1.9 per 100,000 in 1991. See Figure 2. Among the reported cases, 34 (46.6%) were hospitalized and there was one death for a case fatality rate of 13.7 per 1,000.

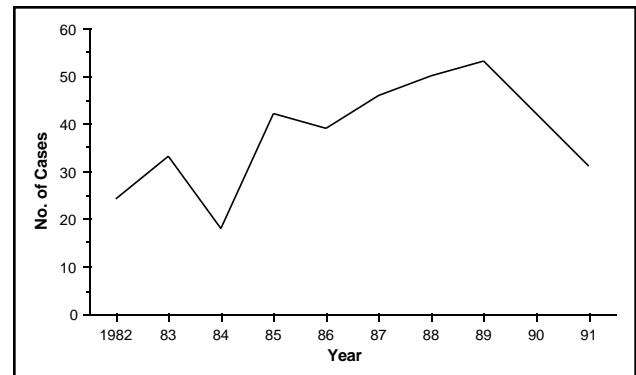


Figure 1. Hepatitis Non-A Non-B cases by year, Missouri, 1982–91

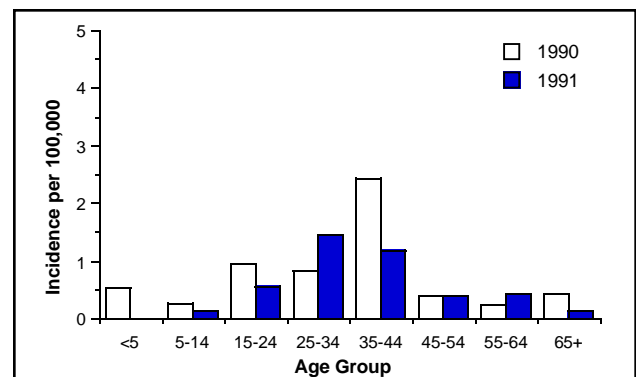


Figure 2. Hepatitis Non-A Non-B incidence by age group, Missouri, 1990–91

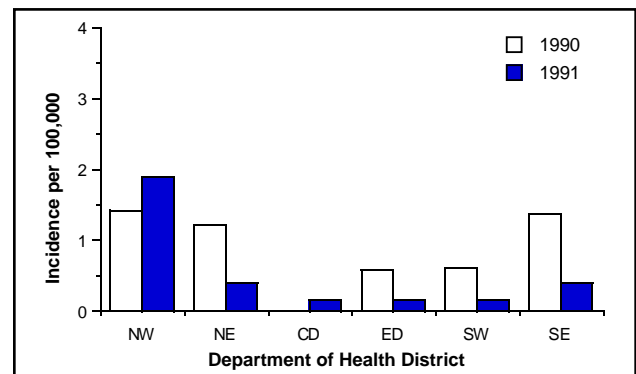


Figure 3. Hepatitis Non-A Non-B incidence by health district, Missouri, 1990–91



# Immunizable Diseases

## Diphtheria

Diphtheria is an acute bacterial disease of the tonsils, pharynx, larynx and nose, occasionally of other mucous membranes or skin, and sometimes the conjunctivae or genitalia. The characteristic lesion, caused by the release of a specific cytotoxin, is an adherent grayish membrane with a surrounding inflammation.

The infectious agent is *Cornyebacterium diphtheriae*, which produces the cytotoxin. A disease of colder months in temperate zones, it involves primarily older children under 15 years of age, but is also found among adult populations in which immunization was neglected. Formerly a common disease, it has largely disappeared in areas where effective immunization programs have been carried out. The disease is transmitted from person to person through droplets from the respiratory system and through contact with the lesion or articles contaminated with the discharges from cases or carriers.

In Missouri, there have been no reported cases since 1979.

## ***Haemophilus influenzae*, type B (Hib)**

*Haemophilus influenzae* is a leading cause of serious systemic bacterial disease in the United States. It is the most common cause of bacterial meningitis, accounting for an estimated 8,000–11,000 cases annually. It occurs primarily among children less than five years of age. The mortality rate is two to eight percent even with currently available antimicrobial therapy, and neurologic sequelae are observed in as many as 15–45 percent of survivors. Almost all cases of *H. influenzae* meningitis among children are caused by strains of type b (Hib). Symptoms of the Hib disease syndrome may include the following: fever, vomiting, lethargy and meningeal irritation and stiff neck and back in older children.

Progressive stupor or coma is common and occasionally there is low-grade fever with CNS involvement. In addition to bacterial meningitis, Hib is responsible for other invasive diseases, including epiglottitis, sepsis, cellulitis, septic arthritis, osteomyelitis, pericarditis and pneumonia. Non-typable strains of *H. influenzae* colonize the human respiratory tract and are a major cause of otitis media and respiratory mucosal infection, but rarely result in bacteremic disease. Hib strains account for only five to ten percent of *H. influenzae* causing otitis media. Hib is spread by droplets and discharges from the nose and throat. Asymptomatic colonization is frequent; Hib can be isolated from the throats of two to five percent of children.

The incidence of Hib meningitis has decreased in Missouri since 1986 to a record low of 42 cases in 1991. See Figure 1. The development of effective vaccines for infants has significantly decreased Hib incidence in the youngest age groups. See Figure 2. The Northwestern health district had the highest incidence in 1990 with a rate of 2.48 per 100,000. Central health district had the highest incidence in 1991 with a rate of 1.78 per 100,000.

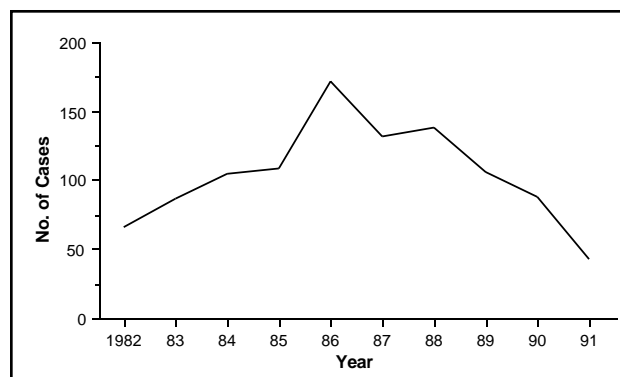


Figure 1. Hib meningitis cases by year, Missouri, 1982-91

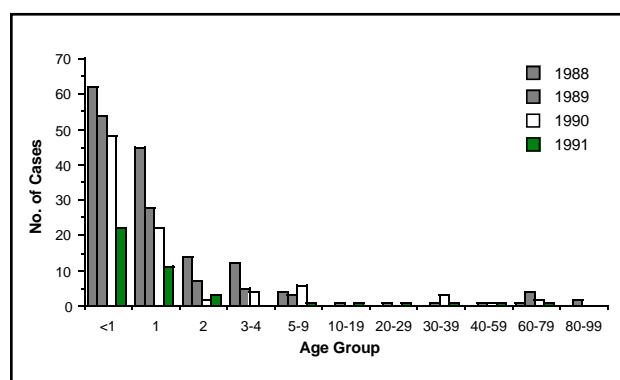


Figure 2. Hib meningitis cases by age group, Missouri, 1988-91

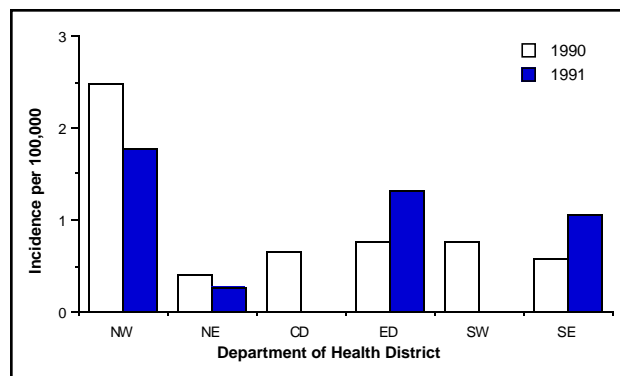


Figure 3. Hib meningitis incidence by health district, Missouri, 1990-91

Among the reported cases, 111 (85%) were hospitalized and there were 13 deaths for a case fatality rate of 100 per 1,000.

Invasive Hib disease other than meningitis became reportable in Missouri in 1990. There were 57 cases reported in 1990 and 39 in 1991.



## Influenza

Influenza is an acute viral disease of the respiratory tract. Symptoms include sudden onset of fever, sore throat, muscle aches and a non-productive cough. Influenza is spread by direct contact with an infected person, or by airborne droplets. Persons are most infectious during the 24 hours before they develop symptoms and are usually infectious for seven days. The incubation period is usually one to three days.

Epidemics of influenza can rapidly evolve with widespread morbidity and serious complications, including viral and bacterial pneumonia. The mortality rate is usually higher in the elderly and those debilitated by chronic cardiac, pulmonary, renal or metabolic disease, anemia or immunosuppression.

In Missouri, influenza activity was lower during the 1990-91 season than in the preceding year. A total of 186 cases of influenza were confirmed. Of these, 127 (68.3%) were type B, with 42 subtyped as B/Ya-magata; 59 (31.7%) were type A, with nine sub-typed as A(H1N1) and one subtyped as A(H3N2). The number of cases reported for the season was 32,084, considerably lower than the 42,000 reported during the 1989-90 season. Incidence peaked in week ten. See Figure 1. The total number of deaths for the season was 987, considerably fewer than the 1,228 reported during the 1989-90 season. Deaths also peaked in week ten. See Figure 2. Outbreaks of influenza-like illness were reported in a long term care facility in the City of St. Louis and in schools in Johnson, St. Charles, and Gentry Counties.

The 1991-92 influenza season in Missouri was characterized by early onset with peak activity in December 1991. There were 357 culture confirmed cases of influenza reported. Of these, 356 (99.7%) were type A, with 190 subtyped as A(H3N2) and nine subtyped as A(H1N1); one type B was reported in early March. Reports of influenza-like illness peaked during week 50 with

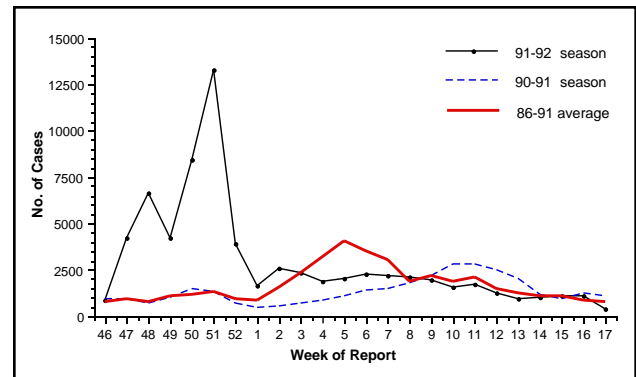


Figure 1. Influenza-like illness by week of report, Missouri, 1991-92, 1990-91 and 1986-91 average

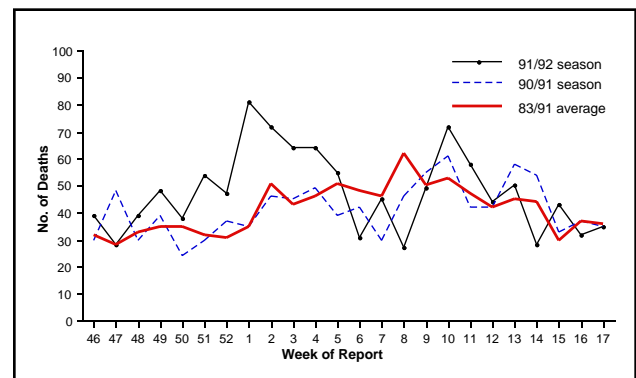


Figure 2. Pneumonia and influenza deaths by week of report, Missouri, 1991-92, 1990-91 and 1986-91 average

pneumonia and influenza deaths peaking during week 52. See Figures 1 and 2. Pneumonia and influenza deaths were above the previous eight-year average for a continuous ten-week period (11/91 to 1/92), and again during weeks 10 and 11 (3/92). Historically, death rates are higher in seasons with A(H3N2) as the predominant strain.

A total of 34 school districts, located in Northeastern, Northwestern and Southeastern health districts reported outbreaks, and 23 of the schools closed for brief periods of time. All outbreaks occurred between November 3 and December 21, 1991, and three of them were confirmed as type A(H3N2). One college in St. Louis County reported an outbreak of confirmed A(H3N2) during the week of November 17, 1991. Two nursing home outbreaks were reported, one in Independence (Northwestern District) and one in Boone County (Central District). Both were confirmed as type A(H3N2). One unconfirmed outbreak was reported in a daycare center.

## Measles (Rubeola, Hard Measles, Red Measles, Morbilli)

Measles is an acute, highly communicable disease of viral origin. The disease is characterized by the following symptoms: fever, conjunctivitis, coughing and Koplik spots on the buccal mucosa. Frequently, other complications may result from either viral replication or bacterial superinfection; these include: otitis media (middle ear infection), bronchopneumonia, diarrhea and encephalitis.

In developed countries, one in every 1,000 reported cases results in death, primarily from respiratory and neurologic complications. Measles is more severe in the very young and in malnourished children. The case mortality rate may be five to ten percent or higher in these populations.

The mode of transmission is by airborne droplet spread, direct contact with nasal or throat secretions of infected persons and, less commonly, by articles freshly soiled with nose and throat secretions. Measles is one of the most highly communicable infectious diseases.

The incubation period is about ten days, varying from 7 to 18 days from exposure to onset of fever, usually 14 days until rash appears. All persons who have not had the disease or been successfully immunized are susceptible. Acquired immunity after disease is permanent. Infants born of mothers who have had the disease are immune for approximately the first six to nine months or more. Vaccination at age 15 months produces immunity in 95–98 percent of recipients; revaccination may produce immunity levels as high as 99 percent.

In Missouri, there were 103 cases reported in 1990 and there was one reported case of measles in 1991. See Figure 1. In 1990, 39 (37.9%) of the reported cases involved children less than five

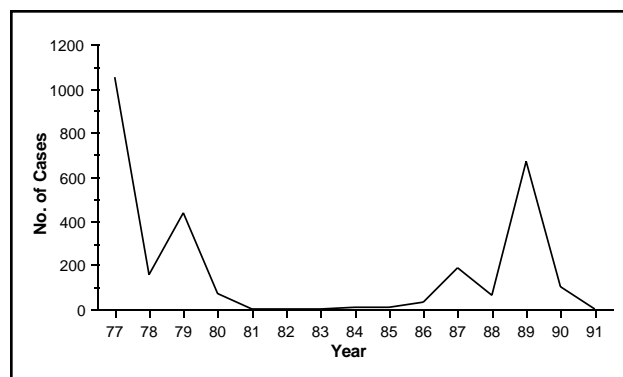


Figure 1. Measles cases by year, Missouri, 1977–91

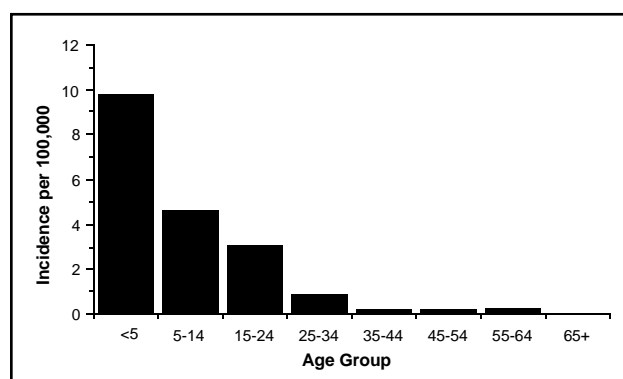


Figure 2. Measles incidence by age group, Missouri, 1990

years of age. See Figure 2. Seventeen of the cases reported in 1990 were reported in children who were either unimmunized or received the immunization before their first birthday. As a result, emphasis was placed on increasing the number of children adequately protected against measles. A second dose of measles vaccine is required for kindergarten and first grade children effective with the 1991–92 school year.

## Mumps (Infectious parotitis)

Mumps is an acute viral disease characterized by swelling and tenderness of one or more of the salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. The central nervous system is frequently involved, usually as aseptic meningitis, almost always without sequelae. Other possible complications include encephalitis, orchitis, pancreatitis, neuritis, arthritis, mastitis, nephritis, thyroiditis and pericarditis. The mode of transmission is by droplet spread or direct contact with saliva of an infected person. The incubation period is about 12–25 days with an average of 18 days.

In Missouri, the 15 year trend shows low incidence of mump since 1979. See Figure 1.

Serologic studies show that 85 percent or more of people have had mumps by the time they reach adulthood, in the absence of immunization. Inapparent infection is common, especially in children under two. Highest incidence is in winter and spring. The incidence of mumps has declined in the United States due to effective immunization. The risk of infection remains highest in children under age 15, but adolescents and adults through age 44 have experienced this illness. See Figure 2.

The Southeastern health district had the highest incidence, with incidence rates of 5.62 per 100,000 in 1990 and 1.94 per 100,000 in 1991. See Figure 3.

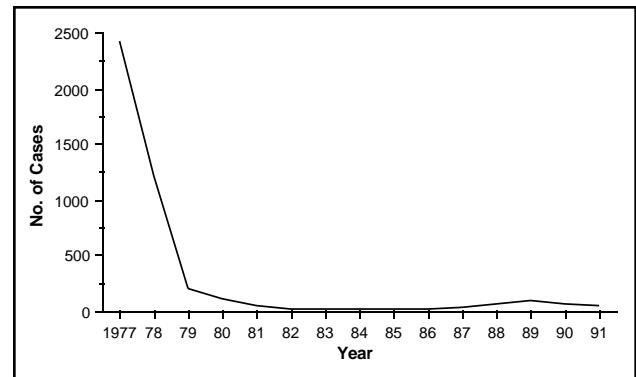


Figure 1. Mumps cases by year, Missouri, 1977–91

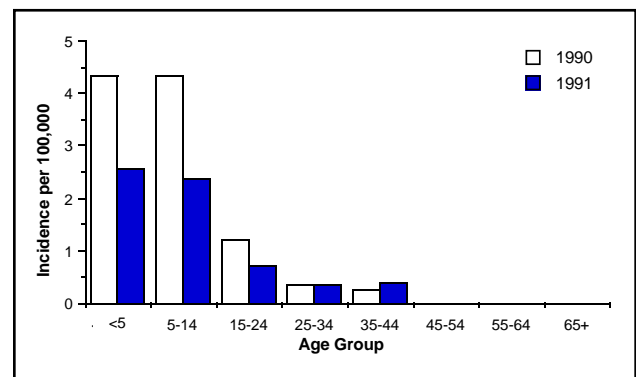


Figure 2. Mumps incidence by age group, Missouri, 1990–91

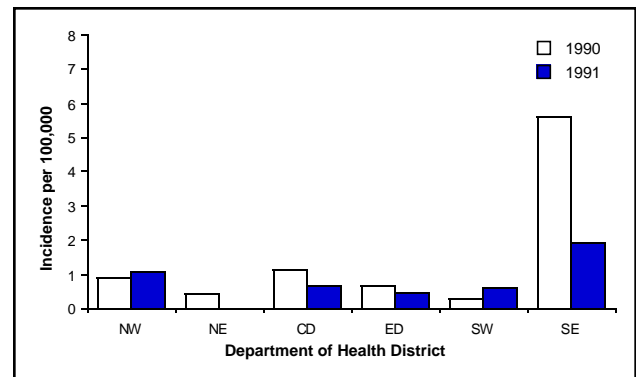


Figure 3. Mumps incidence by health district, Missouri, 1990–91

## Pertussis (Whooping Cough)

Pertussis (whooping cough) is a highly contagious bacterial disease, involving the respiratory tract. Pertussis has an infection rate of up to 90 percent in non-immune household contacts. The disease is most often due to exposure to older siblings and adults with mild or atypical illness. During the first year of life, pertussis can be a particularly severe illness, with complications that include pneumonia, seizures and encephalopathy. More than 50 percent of children less than one year of age reported to have pertussis are hospitalized. In infants less than six months of age, the case fatality rate is approximately one percent.

In Missouri, the number of cases increased dramatically in 1989 and remained above historic levels in 1990 and 1991. See Figure 1. The majority of cases reported affect children of preschool age. See Figure 2. In 1990, 104 of the reported 116 cases (90%) were children less than five years of age. In 1991, this age group involved 70 of 83 cases (84%).

The Northeastern health district had the highest incidence in 1990 with an incidence rate of 3.59 per 100,000. The Southeastern health district had the lowest incidence in 1990 with an incidence rate of .97 per 100,000. In 1991, the incidence was more similar in all health districts. See Figure 3.

The incidence of pertussis was lowest early in 1991 during the months of March and May. Incidence steadily increased during the summer and peaked in September 1991. See Figure 4.

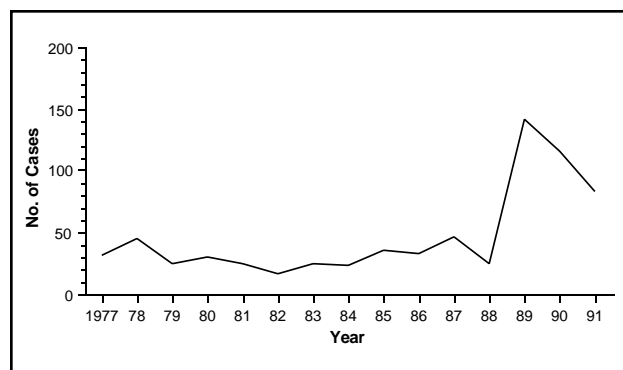


Figure 1. Pertussis cases by year, Missouri, 1977-91

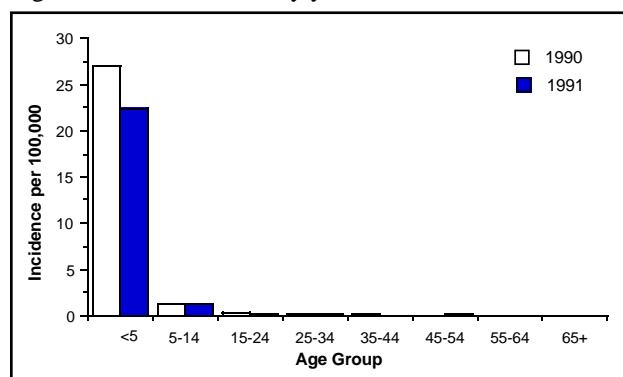


Figure 2. Pertussis incidence by age group, Missouri, 1990-91

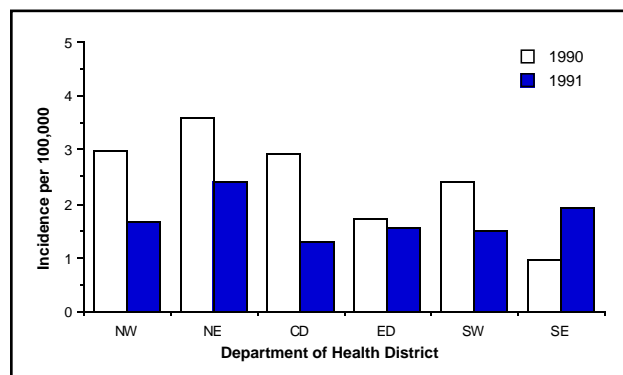


Figure 3. Pertussis incidence by health district, Missouri, 1990-91

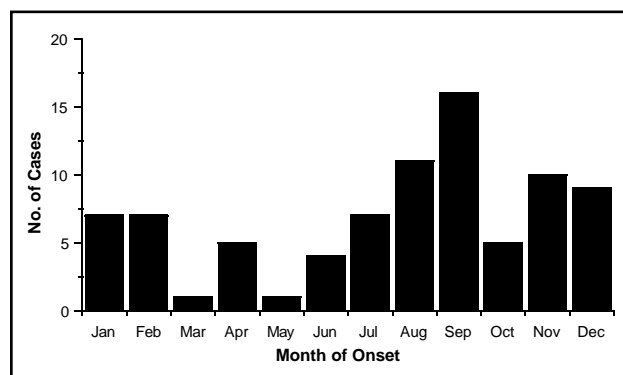


Figure 4. Pertussis incidence by month of onset, Missouri, 1991

## Poliomyelitis, Acute (Polioviral fever, Infantile paralysis)

Poliomyelitis is an acute viral infection with severity ranging from inapparent infection to non-specific febrile illness, aseptic meningitis, paralytic disease and death. Symptoms of poliomyelitis include fever, headache, malaise, nausea and vomiting, muscle pain, stiffness of the neck and back and subsequent flaccid paralysis. Death can occur as a result of the failure of the respiratory muscles.

Poliovirus types 1, 2 and 3 (genus *Enterovirus*) are all capable of causing infection, illness and paralysis. The disease is transmitted through direct contact and man is the only known reservoir. Where sanitation is poor the major route of transmission is fecal-oral.

Missouri has not had a case of poliomyelitis reported since 1988. See Figure 1.

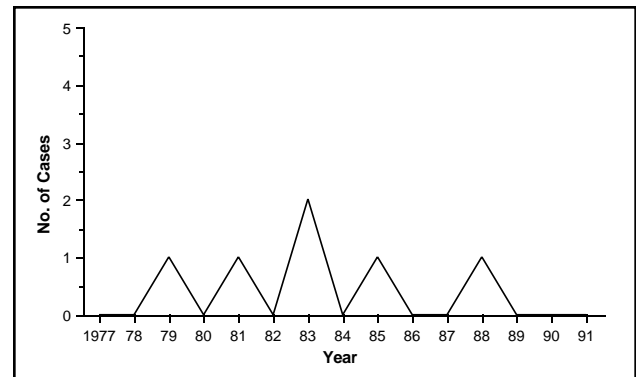


Figure 1. Poliomyelitis cases by year, Missouri, 1977–91

## Rubella (German Measles)

Rubella is a mild febrile disease with diffuse punctate and maculopapular rash, sometimes resembling that of measles or scarlet fever. Children usually present with no well-defined symptoms. However, adults may experience symptoms of low-grade fever, headache, malaise, mild coryza and conjunctivitis. Up to 50 percent of the infections can occur without rash.

Congenital rubella syndrome occurs in greater than 25 percent of the women who contract rubella during the first trimester of pregnancy. The risk of a single congenital defect falls to 10–20 percent by the 16th week of pregnancy, and congenital defects are rare when the infection occurs after the 20th week. Fetuses infected with rubella are at the greatest risk of intrauterine death, spontaneous abortion and congenital malformation of major organ systems. Congenital defects can be single or multiple.

Missouri had no reported cases of rubella in 1987 and 1988, and has had five or fewer cases each year since 1989. See Figure 1. Rubella rates are very low due to high immunization coverage.

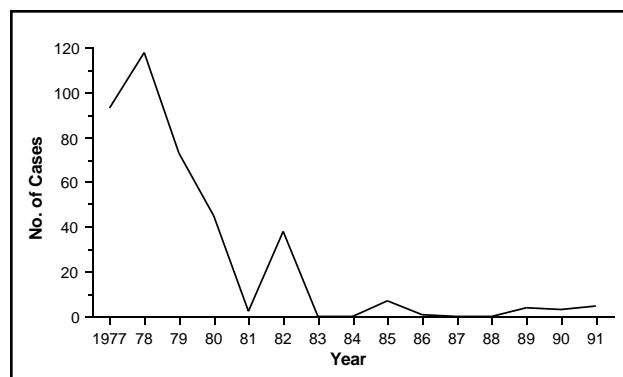


Figure 1. Rubella cases by year, Missouri, 1977–91

# Sexually Transmitted Diseases

## *Chlamydia trachomatis* Infections

*Chlamydia trachomatis* is a bacterial organism responsible for a wide range of sexually transmitted diseases, including non-gonococcal urethritis (NGU) and mucopurulent cervicitis (MPC). NGU is a common genital infection among males, while MPC is seen among women. The clinical manifestations of genital disease caused by this organism are indistinguishable from gonorrhea. In males, the disease may be asymptomatic in as many as ten percent of the cases. The possible complications of male urethral infections include epididymitis, infertility and Reiter's syndrome. In females, the clinical manifestations of *C. trachomatis* infections are similar to gonococcal infections, with the disease frequently presenting as a mucopurulent endocervical discharge, with edema and inflammation of the endocervical epithelium. Complications that can result from infections with this organism include salpingitis, infertility and ectopic pregnancy.

*Chlamydia trachomatis* infections decreased five percent from 11,151 cases reported in 1990 to 10,643 cases in 1991. This is the first decrease in the reported incidence since reporting was required in 1986. See Figure 1. Widespread clinical therapy and dual treatment of all gonorrhea cases (gonorrhea therapy plus chlamydia therapy) combined with more extensive screening from 1986 through 1991 may have contributed to the noted decreases. Positivity in the selective screening program conducted by the Department of Health has decreased from 16 percent five years ago to 10 percent last year.

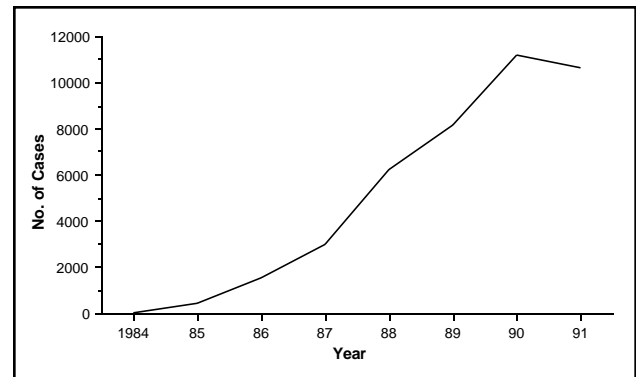


Figure 1. *Chlamydia trachomatis* cases by year, Missouri, 1984-91

## Genital Herpes

Genital herpes is a sexually transmitted disease caused by the herpes simplex viruses (HSV-1 and HSV-2). Genital herpes is usually caused by HSV-2, although it can also be caused by HSV-1. Genital herpes occurs mainly in adults. The primary and recurrent lesions can occur without symptoms. In women, the infectious sites are the cervix and the vulva and recurrent disease usually involves the vulva, perineal tissue, legs and buttocks. In men, lesions appear on the glans penis or prepuce, and in the anal and rectal areas.

The primary mode of transmission of HSV-1 is by contact with saliva of infected carriers. Transmission of HSV-2 is usually by sexual contact. Both types can be transmitted to various sites by oral-genital or oral-anal contact.

Genital herpes decreased two percent from 3,310 cases reported in 1990 to 3,244 cases in 1991. St. Louis County, Kansas City and outstate Missouri reported slight increases in cases and St. Louis City reported a decrease of 359 cases.

## Gonococcal Pelvic Inflammatory Disease (GPID) (Gonococcal Salpingitis)

Pelvic inflammatory disease, or acute salpingitis, is a common complication of gonorrhea in women. This GPID has a major impact because of its acute manifestations and its potential long-term effects of pelvic discomfort and pain, infertility and ectopic pregnancy. Patients with salpingitis have symptoms of lower abdominal pain, abnormal menses and painful coitus.

GPID decreased three percent from 396 cases reported in 1990 to 384 cases in 1991. Kansas City reported a 353% percent increase from 17 cases in 1990 to 77 cases in 1991. Outstate Missouri reported a 2.5 percent increase from 79 cases in 1990 to 81 cases in 1991. St. Louis City reported a 15.9 percent decrease from 208 cases in 1990 to 175 cases in 1991. St. Louis County reported a 44.6 percent decrease from 92 cases in 1990 to 51 cases in 1991.



## Gonorrhea

Gonorrhea includes a number of inflammatory conditions of the genitourinary tract caused by *Neisseria gonorrhoeae*. Gonorrhea is a sexually transmitted, bacterial disease which affects epithelial tissues and differs in course in men and women.

In females, urethritis or cervicitis develops a few days after exposure to the infecting organism. In females, these cases are usually so mild that they go unnoticed. Chronic infections are common, especially in women. Anorectal and pharyngeal infections are common in both sexes. Conjunctivitis, which rarely occurs in adults, can cause blindness in infants if not treated rapidly.

In Missouri, the reported incidence of gonorrhea decreased by 5.2 percent to 20,012 cases in 1990. See Figure 1. The incidence rate decreased to 391.1 per 100,000. In 1990, St. Louis City reported an increase of 475 cases, St. Louis County 192 and outstate Missouri 20; Kansas City reported a decrease of 1,734 cases.

In 1991, the reported incidence of gonorrhea decreased by 12.8 percent to 17,450 cases. The incidence rate decreased to 338.3 per 100,000. Decreases occurred in all major subdivisions of the state. St. Louis City reported a decrease of 752 cases, St. Louis County 280, Kansas City 1,199 and outstate Missouri 331. See Figure 2.

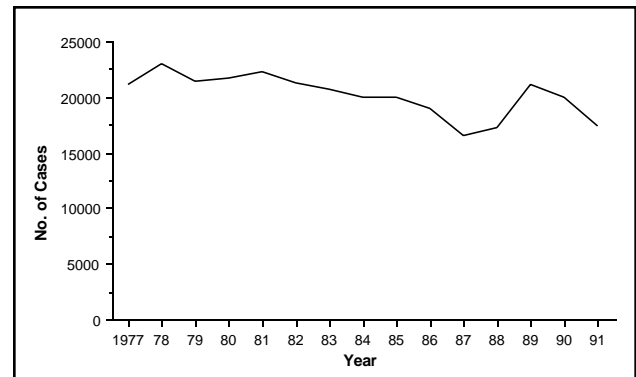


Figure 1. Gonorrhea cases by year, Missouri, 1977–91

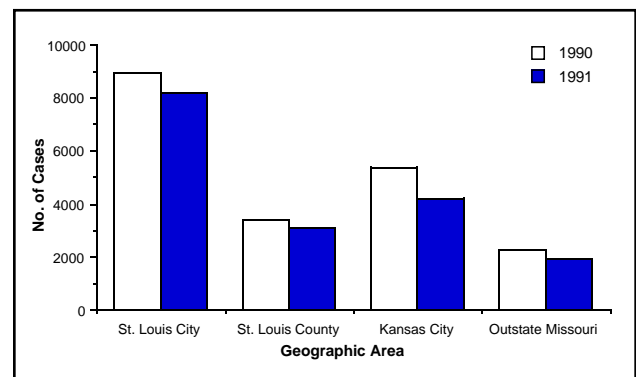


Figure 2. Gonorrhea cases by geographical area, Missouri, 1990–91

## HIV/AIDS (Human Immunodeficiency Virus, Acquired Immunodeficiency Syn- drome)

Human immunodeficiency virus (HIV) is a retrovirus of which two types have been identified, type 1 (HIV-1) and type 2 (HIV-2). Although these viruses are serologically distinct, they have similar pathological and epidemiological characteristics. HIV-1 infection is found in the Americas, Europe, sub-Saharan Africa and in most other countries. HIV-2 infection has been found primarily in West Africa and in western countries which have an epidemiological link to West Africa.

HIV is transmitted from person to person through sexual contact, the sharing of HIV-contaminated needles and syringes by injecting drug users and from an infected mother to her infant before or at the time of birth.

Acquired immunodeficiency syndrome (AIDS) is a specific group of diseases and conditions indicative of severe immunosuppression related to HIV infection. The clinical manifestations of HIV, unlike those of most other reportable diseases, do not usually develop until years after the infection. The average time between infection with HIV and a diagnosis of AIDS is approximately ten years. This long incubation period makes statistical analysis of HIV infection based on reported AIDS cases difficult.

The severity of HIV-related illnesses is directly related to the degree of dysfunction of the immune system. Onset of clinical illness is usually insidious with non-specific symptoms such as lymphadenopathy, loss of appetite, diarrhea, weight loss, fever, fatigue and vaginal candidiasis. These non-specific symptoms are not sufficient, by themselves, to establish a diagnosis of HIV infection. Such a diagnosis can only be established through specific laboratory tests which confirm the presence of infection with the virus.

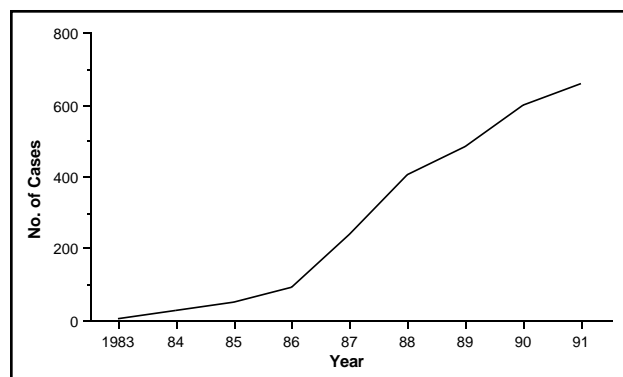


Figure 1. AIDS cases by year, Missouri, 1983-91

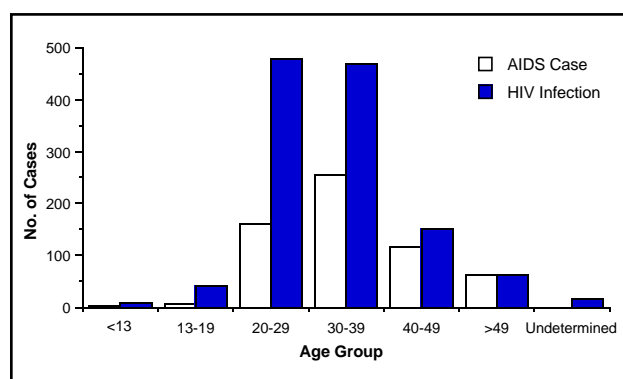


Figure 2. AIDS and HIV infection incidence by age group, Missouri, 1990

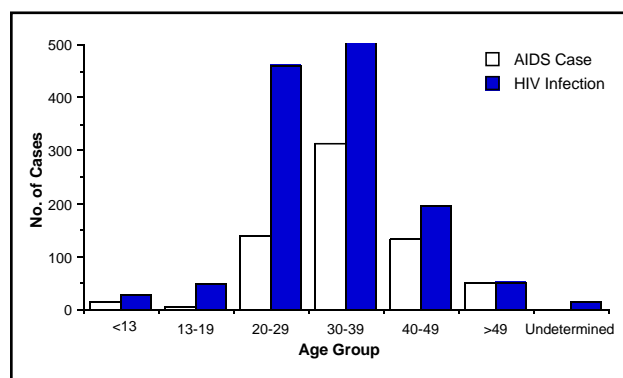


Figure 3. AIDS and HIV infection incidence by age group, Missouri, 1991

Over time, the immune system dysfunction associated with HIV infection worsens, making the individual increasingly vulnerable to certain serious opportunistic infections and cancers, including *Pneumocystis carinii* pneumonia, Kaposi's sarcoma, esophageal candidiasis, disseminated *Mycobacterium avium* infection and lymphoma of the brain. The presence of such infections and cancers allows a diagnosis of AIDS to be made.

In Missouri, there were 657 cases of AIDS reported in 1991, a 9.7 percent increase over 1990 in which there were 599 cases reported. The number of cases of AIDS in Missouri has increased each year since it became a reportable disease in 1983. See Figure 1. In 1991, there were 1,299 HIV infections in Missouri, an increase of 5.8 percent from 1990 in which 1,228 HIV infections were reported.

In 1990 and 1991, the largest number of AIDS and HIV infections occurred in the 20-29 and 30-39 years age groups. See Figures 2 & 3. Cases in these two age groups are primarily white males with black males forming the second largest group. See Figures 4 & 5. The largest increase in the number of reported cases of AIDS has been in black males, in whom there was an 18.6 percent increase in 1991. The white male population had a 6.3 percent increase in 1991.

Males comprised nearly 94 percent of the total number of AIDS cases in 1990 and 93 percent in 1991. The major risk factor for AIDS and HIV infection in males was homosexual or bisexual activity for both 1990 and 1991 (See Figures 6 & 7), with 74 percent of the reported AIDS cases exposed to this risk factor in 1990 and 73 percent in 1991. Nearly 70 percent of HIV infections in 1990 had been exposed to homosexual activity and 65 percent in 1991. Intravenous drug use was the other major risk factor for AIDS and HIV infection in 1990 and 1991.

The predominant areas for reported cases of AIDS and HIV infection in 1990 and 1991 were the major metropolitan areas of St. Louis and Kansas City. See Figure 8. The metropolitan areas of St. Louis and Kansas City reported 73 percent of the AIDS cases and 60 percent of the HIV infections in 1990. In 1991, these metropolitan areas reported 67 percent of the AIDS cases and 59 percent of the HIV infections.

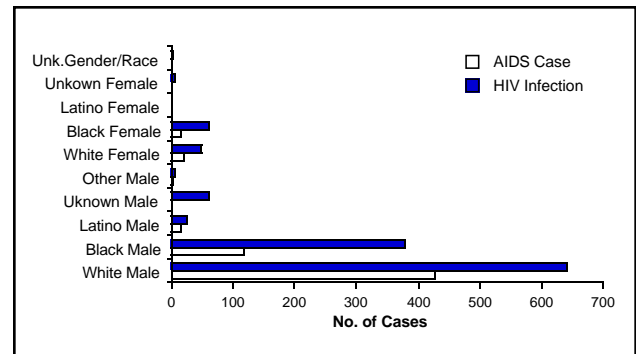


Figure 4. AIDS and HIV infection incidence by race, Missouri, 1990

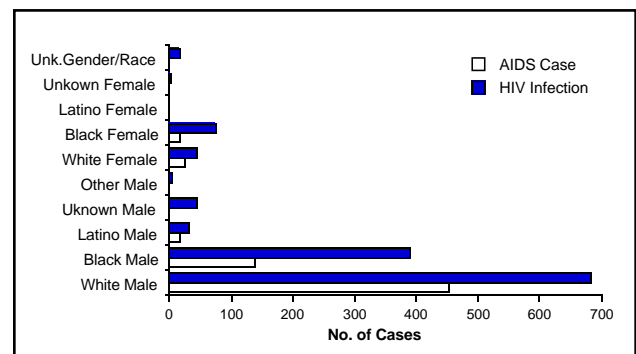


Figure 5. AIDS and HIV infection incidence by race, Missouri, 1991

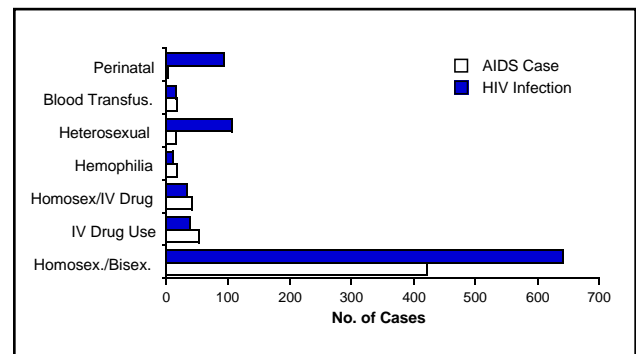


Figure 6. AIDS and HIV infection incidence by sexual activity, Missouri, 1990

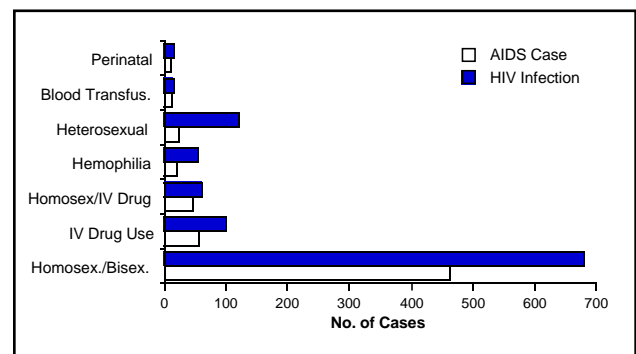


Figure 7. AIDS and HIV infection incidence by sexual activity, Missouri, 1991

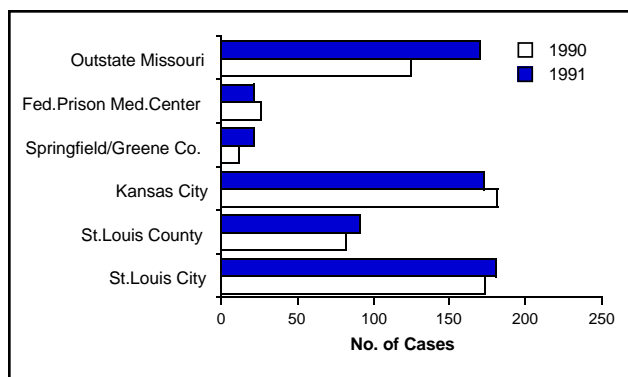


Figure 8. AIDS incidence by geographical area, Missouri, 1990-91

## Non-gonococcal Urethritis (NGU)

While *Chlamydia* is the most frequently isolated organism in gonococcal-negative infections, there are a number of other agents involved in these infections. *Ureaplasma urealyticum* is considered to be the etiologic agent in 10–20 percent of chlamydia-negative cases of NGU.

In Missouri, reported cases of NGU increased 17 percent from 7,737 cases in 1990 to 9,068 cases in 1991. This increase occurred in all areas of the state with the exception of St. Louis City. See Figure 1. This is the third consecutive year in which an increase has occurred.

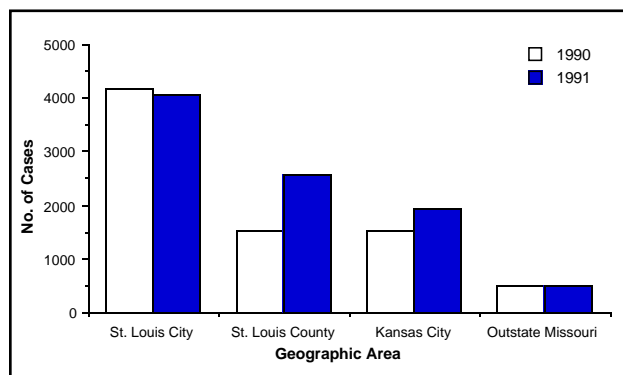


Figure 1. Non-gonococcal urethritis cases by geographical area, Missouri, 1990–91

## Penicillinase-producing *N. gonorrhea* (PPNG)

*Neisseria gonorrhoeae* has become resistant to penicillin, ampicillin, amoxicillin, tetracycline, doxycycline and erythromycin. The resistance is due to the plasmid-mediated production of beta-lactamases or chromosomal mediated resistance. All gonorrhea is considered to be resistant at this time and is monitored by the participation of St. Louis and Kansas City in the National Gonorrhea Isolate Surveillance Project. Routine beta lactamase testing is no longer performed.

## Syphilis (Primary, Secondary and Early Latent under one year)

Syphilis is both an acute and chronic disease caused by a spirochetal organism, *Treponema pallidum*. The disease is characterized by a primary lesion, a secondary eruption invading the skin and mucous membranes, and by late lesions of the skin, bone, and viscera. Syphilis can have long latency periods and may involve the central nervous system (CNS) and cardiovascular system. The primary lesion (chancre) usually appears about three weeks after infection as a painless ulcer with a serous exudate at the site of the initial infection. After four to six weeks, the chancre begins to disappear and a generalized secondary infection may develop. CNS involvement and subsequent disease may occur at any of the stages of syphilis infection. Death or serious disabilities rarely occur with the early stages of syphilis; late manifestations of the disease, however, tend to impair health, limit mobility, and shorten life expectancy.

Fetal infections occur with a high frequency in infected pregnant women. Syphilis is transmitted by direct contact with infectious exudates from the early lesions of skin and mucous membranes, and by blood of infected persons during sexual contact. The incubation period for syphilis is usually three weeks and ranges from ten days to three months.

In Missouri, the reported incidence of early syphilis increased significantly in 1990 with an increase of 177 cases. See Figure 1. Primary and secondary cases increased 40 percent, from 162 cases in 1989 to 272 cases in 1990. Early latent cases also showed a 40 percent increase, from 99 cases in 1989 to 166 in 1990. Kansas City reported 130 primary and secondary cases and 59 early latent cases, almost half of the early syphilis cases reported in Missouri. The majority of the Kansas City cases were reported around crack-cocaine

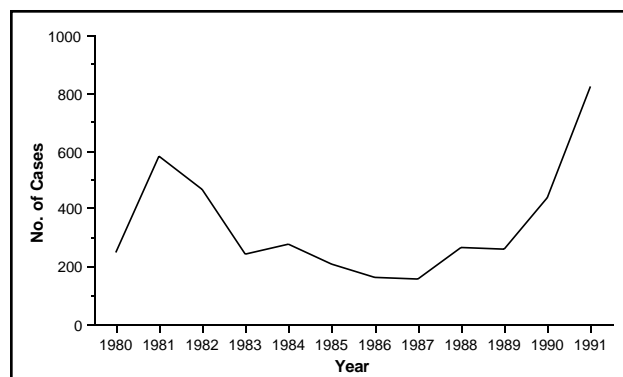


Figure 1. Early syphilis cases by year, Missouri, 1980-91

using areas where increases have also been noted in other sexually transmitted diseases. The 1990 primary and secondary syphilis incidence rate of 5.3 per 100,000 was considerably lower than the national rate of 20.4 per 100,000 for 1990.

The reported incidence of early syphilis increased significantly in 1991 compared to 1990 with an increase from 381 cases to 819. Primary and secondary cases increased 110 percent, from 272 in 1990 to 572 cases in 1991. Early latent cases increased 49 percent, from 166 cases in 1990 to 247 in 1991. Kansas City reported almost half of the early syphilis cases in 1991, 315 primary and secondary cases and 128 early latent cases. The 1991 primary and secondary rate of 11.1 per 100,000 was again lower than the national rate of 17.3 per 100,000 for 1991.

### Congenital Syphilis

Infants born with syphilis from an infected pregnant mother have congenital syphilis. Congenital infections may result in late manifestations such as Hutchinson's teeth, saddlenose, saber shins, interstitial keratitis and deafness.

In Missouri, congenital syphilis increased 40 percent from 10 cases reported in 1990 to 15 cases in 1991. This trend is expected to continue over the next few years due to the revised and expanded surveillance criteria for congenital syphilis initiated July 1, 1990 and increasing rates of infectious syphilis.

# Tuberculosis

## Tuberculosis (TB) (*Mycobacterium tuberculosis*)

Tuberculosis is a systemic mycobacterial disease with diverse manifestations. Tuberculosis is spread primarily by airborne droplets coughed up by a person with untreated tuberculosis of the lungs or larynx. Close contacts to a person with undiagnosed or untreated pulmonary tuberculosis are at high risk for becoming infected. About ten percent of infected persons will develop clinically active disease at some time in their lives and the risk is considerably higher in persons who are immunosuppressed. Individuals who are infected but do not develop clinically active pulmonary or laryngeal disease are not usually infectious. The initial infection usually goes unnoticed; tuberculin sensitivity appears within a few weeks. The site of disease involvement is usually the lungs, but extrapulmonary tuberculosis represents approximately 15 percent of cases reported annually. Extrapulmonary tuberculosis may affect any organ or tissue and includes tuberculous meningitis and acute hematogenous (miliary) tuberculosis and may involve the lymph nodes, pleura, pericardium, kidneys, bones and joints, larynx, skin, peritoneum or eyes.

Persons who are infected with the human immunodeficiency virus (HIV) are an important risk group for tuberculosis. The nationwide excess in observed tuberculosis cases over expected values has been attributed to AIDS patients who were also infected with tuberculosis. In 1986, after three decades of steadily decreasing morbidity of tuberculosis, the annual morbidity of tuberculosis in the United States increased. The increase occurred mainly in geographic areas and demographic groups which had large numbers of AIDS cases.

Other important risk groups for tuberculosis include foreign-born persons who are refugees of countries where tuberculosis is endemic in the population. In some areas of the United States,

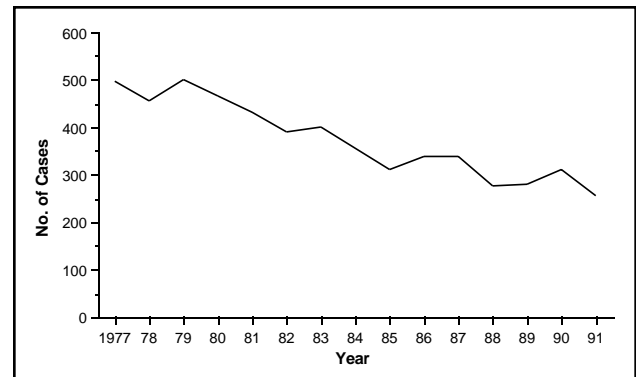


Figure 1. Tuberculosis cases by year, Missouri, 1977-91

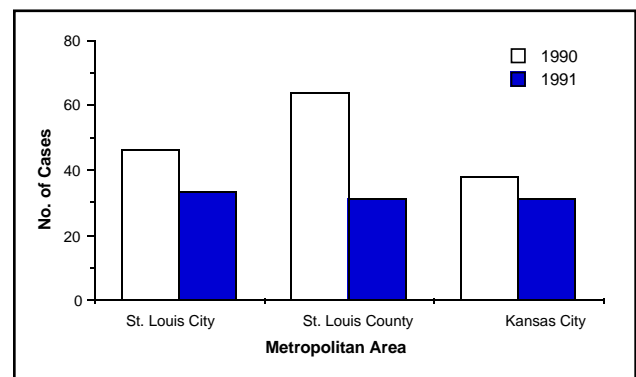


Figure 2. Tuberculosis incidence by metropolitan area, Missouri, 1990-91

tuberculosis infection levels in the refugee population have been reported as high as 65 percent. Residents of nursing homes and correctional institutions, are at high risk for tuberculosis, along with low-income populations and certain minority groups.

In Missouri, there were 254 cases of tuberculosis reported in 1991. This was an 18.6 percent decrease from 1990 when 312 cases were reported. See Figure 1. The incidence of tuberculosis decreased by 53 cases (35.8%) in the major metropolitan areas of St. Louis City, St. Louis County and Kansas City. See Figure 2.

The percentage of tuberculosis cases occurring among the elderly continues to increase in Missouri. In 1990, 45.2 percent (141/312) occurred among individuals age 65 or older. In 1991, 46.5 percent (118/254) occurred among the elderly. See Figure 3. An increasing percentage of cases is

also occurring in the 25-44 years age group, with 25.3 percent (79/312) in 1990 and 26.8 percent (68/254) in 1991. The number of cases occurring in children under 15 years of age declined in 1991. Additional cases were reported in this age group in 1990 as a result of an outbreak in an elementary school in St. Louis County. In 1990, 11.9 percent (37/312) of the cases occurred in children under 15 years of age. In 1991, only 3.9 percent (10/254) occurred in this age group.

In 1991, 67.3 percent of the cases occurred among whites, 25.2 percent among blacks and 7.5 percent among Asians. This was a decrease in the percentage of cases occurring among blacks from 34.3 percent in 1990 to 25.2 percent in 1991. See Figure 4. While a decrease was noted among blacks, there was an increase for the Asian population, from 3.2 percent in 1990 to 7.5 percent in 1991. The cases in St. Louis City were predominantly in the black population. Specifically, 63.6 percent of the cases occurred among blacks in 1991, although this was a decrease of 71.7 percent from the number reported in 1990. In St. Louis County, the percentage of cases occurring among blacks decreased from 46.9 percent in 1990 to 29.0 percent in 1991. In Kansas City, the percentage of cases among blacks continued to increase from 55.3 percent in 1990 to 61.3 percent in 1991. Minority populations in Missouri are nearly four times as likely as whites to contract tuberculosis. The incidence rate for minorities was 14.1 per 100,000 with an incidence rate of 11.7 per 100,000 for blacks and 46.0 per 100,000 for Asians. In comparison, the rate among whites was 3.8 per 100,000.

Figure 5 depicts the incidence of disease occurring in each district of the state for the years 1990 and 1991.

The relationship between tuberculosis and AIDS has become a growing concern to public health officials. Of the 2,557 cases of AIDS reported among Missourians through 1991, a total of 49

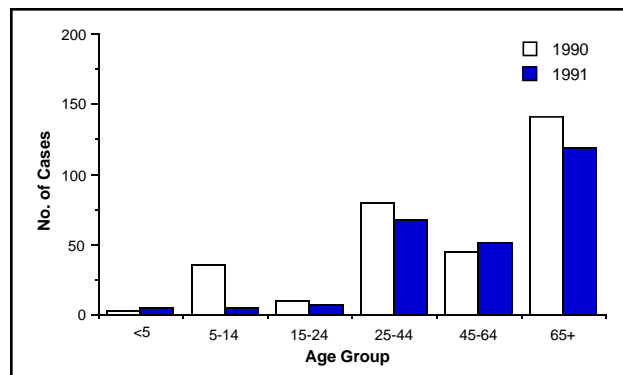


Figure 3. Tuberculosis incidence by age group, Missouri, 1990-91

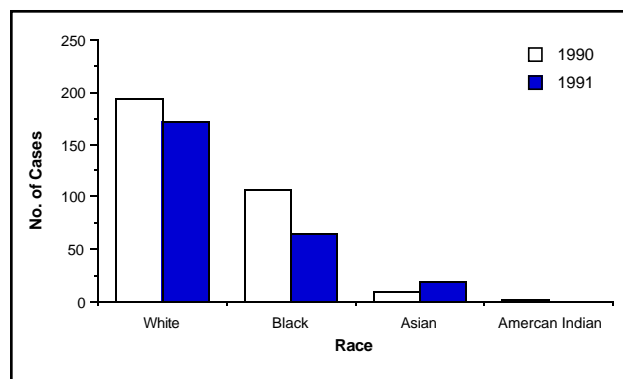


Figure 4. Tuberculosis incidence by race, Missouri, 1990-91

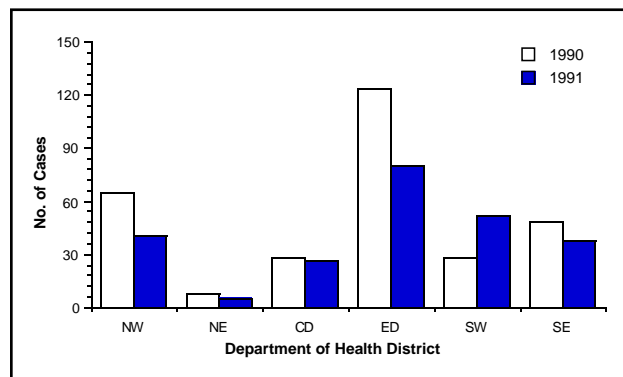


Figure 5. Tuberculosis incidence by health district, Missouri, 1990-91

individuals (1.92%) were reported to have a diagnosis of tuberculosis as well. In addition, a total of 69 cases of mycobacteria other than tuberculosis (MOTT) were reported among AIDS patients. *Mycobacterium avium* complex was the most common mycobacteria isolated from AIDS patients and were isolated from 52 patients (75.4%).



# Zoonotic Diseases

## Animal Bites

One-half to one million animal bites occur in the United States each year. Dogs account for over 75 percent of the bites, cats 15 percent and wild carnivores and humans account for the remainder. One percent of all emergency room visits are due to animal bites. Classified as the most serious of pet-associated health hazards, based on frequency, severity and financial expenditures, animal bites are estimated to be at least 50 percent under reported.

Children are at the highest risk, with an age adjusted attack rate for the 5–14 years age group of 1,000 per 100,000. Others at high risk are occupational groups such as meter readers, animal control officers and delivery personnel. Approximately ten percent of all animal bites require suturing and one to two percent require hospitalization. The fatality rate for animal bites is not known, but it is estimated that there are about ten fatalities per year. Larger dog breeds are responsible for more severe bites. Owned dogs protecting their territory are more likely to bite than strays. Medical costs average about \$75.00 per incident, and the total cost is estimated to be from \$38–75 million per year.

The most common infection associated with bites is *Pasteurella multocida*. Other organisms involved are *Staphylococcus aureus*, aerobic streptococci and anaerobes such as *Peptococcus spp.*, *Bacteroides spp.* and *Fusobacterium spp.* Other specific organisms can be involved with wild animals and rodents.

In Missouri, animal bites are poorly reported and come mainly from metropolitan areas. In 1990, 5,442 animal bites were reported and in 1991 6,514 were reported.

## Arthropod-borne Viral Encephalitides

Encephalitis is an acute inflammatory process of the brain, spinal cord and meninges and is normally of short duration. Signs and symptoms are of central nervous system origin and include fever, severe headaches, stupor, disorientation, coma, spasticity, tremors and convulsions. Treatment is supportive in nature and post disease sequelae occur.

There are four encephalitides of importance in the United States: Eastern equine, Western equine, St. Louis and LaCrosse. All four encephalitides are vectored by specific mosquitoes or group of mosquitoes between birds, equine or humans. Man is a dead end host, since transmission does not occur from humans to other humans or animals. Fatalities are highest in Eastern equine encephalitis.

Methods of prevention involve a system of surveillance in the normal hosts of birds and equine and mosquito control to prevent the spread and transmission to man. Missouri does not have its own system of surveillance in the normal hosts. It relies on surveillance systems in Illinois, Ohio and other neighboring states.

All but Eastern equine encephalitis have occurred in Missouri. Incidence of these diseases has been low during the past decade in Missouri and the United States.

## Brucellosis

Brucellosis is a bacterial disease of humans, cattle, swine and dogs in the United States. The disease is characterized by an acute or insidious onset in humans with intermittent fever, headache, malaise, weakness, arthralgia and generalized flu-like symptoms that persist for an extended time period.

Historically, the disease was passed to humans from cattle via unpasteurized milk. With the advent of pasteurization of milk and the control and eradication of the disease in cattle, human brucellosis from cattle, with the exception of occupational exposure, has become a rarity. Canine brucellosis however, is emerging as a new zoonotic disease challenge. The dog breeding industry is faced with the task of initiating its own voluntary control and prevention programs. Since the canine is a companion animal with intimate social household contact with humans, the stage has been set for more transmission of this organism to humans. At this point, human brucellosis cases are not differentiated as to whether they are of *Brucella abortus* or *Brucella canis* origin.

In 1990, Missouri had one human case and in 1991 there were three cases. See Figure 1. The State Public Health Laboratory discontinued serologic testing for brucellosis as of June 30, 1988. Commercial laboratories use a variety of tests which makes diagnosis in humans in Missouri difficult and may contribute to the low level of reporting.

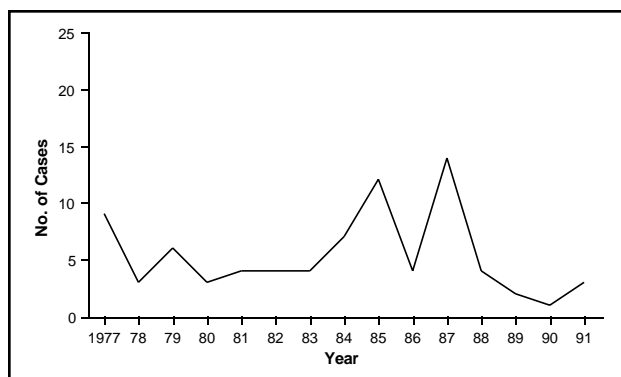


Figure 1. Brucellosis cases by year, Missouri, 1977-91

## Ehrlichiosis

Ehrlichiosis is an acute febrile illness of humans, thought to be transmitted by the brown dog tick, *Rhincephalus sanguineus*. As with other tick-borne diseases, it has an acute onset with flu-like symptoms including headache, myalgia, anorexia, nausea and in some instances a rash. Clinical laboratory abnormalities include leukopenia, thrombocytopenia and elevated levels of hepatic aminotransferase. The causative organism *Ehrlichia chaffeensis* was isolated in 1991 in Arkansas.

Missouri has had a total of 50 cases since 1988, which is 12.5 cases per year and represents a higher level than has been reported from any other state. There were 17 cases reported in 1990 and 13 cases in 1991. See Figure 1.

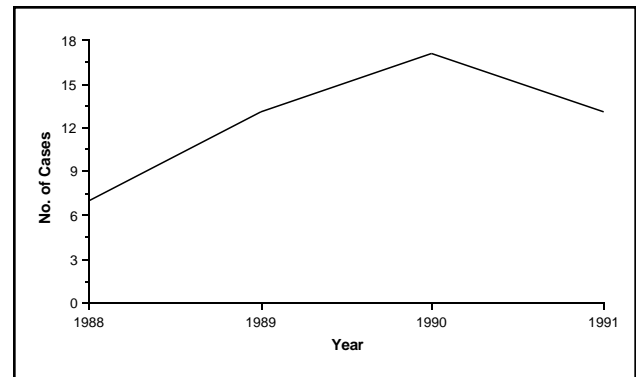


Figure 1. Ehrlichiosis cases by year, Missouri, 1988–91

## Histoplasmosis

Histoplasmosis presents as a granulomatous disease of the lungs with varying degrees of severity. Normally children are infected while playing in dirt that contains histoplasma spore forms known as conidia; infection results from inhalation of airborne conidia. The disease usually causes sniffles for a few days, with the child not complaining of any illness. The healthy child wards off the disease and knowledge of infection is not known until later in life when chest x-rays show walled off old lesions of histoplasmosis.

Single point source outbreaks do occur when an area high in histoplasma spores is excavated and the airborne spores expose susceptible individuals. Casual contact with spore laden soil can cause disease in immunosuppressed individuals.

Histoplasmosis is an endemic mycotic disease in Missouri and the Missouri and Mississippi River Valley Regions. Field studies have shown up to 85 percent of rural Missourians skin test positive for histoplasmosis.

Historically, Missouri has averaged about 185 new cases of histoplasmosis per year. However, reported incidence dropped dramatically when the State Public Health Laboratory ceased providing diagnostic testing as of June 30, 1988. In 1990, there were 15 cases reported and in 1991 there were 24 cases reported. See Figure 1.

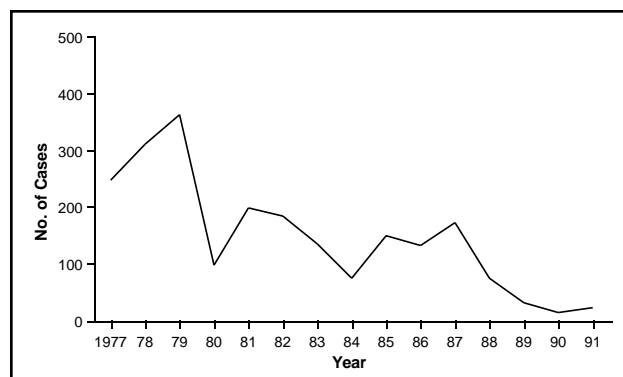


Figure 1. Histoplasmosis cases by year, Missouri, 1977-91

## Leptospirosis

Leptospirosis is a bacterial infection of man and animals that is prevalent through out the world. The disease manifests itself with a sudden onset, fever which maybe diphasic, headache, severe myalgia, conjunctival suffusion, rash with hemorrhage into the skin and mucous membranes, jaundice, renal involvement and meningitis resulting in mental confusion or depression. Illness can last from weeks to months. The organism is eliminated from the host via the kidney in the urine. Transmission in nature is by skin contact with urine contaminated water, soil or vegetation.

Prevalence of leptospirosis in animals in Missouri is high, causing sufficient disease and economic loss to justify the annual vaccination of cattle and canine. This, coupled with wild animal infection and transmission, should present a high incidence of leptospirosis in man. For various reasons, the disease is under reported and undiagnosed in man in Missouri and very few cases have been reported. In 1990, three cases were reported and in 1991 four cases were reported. See Figure 1.

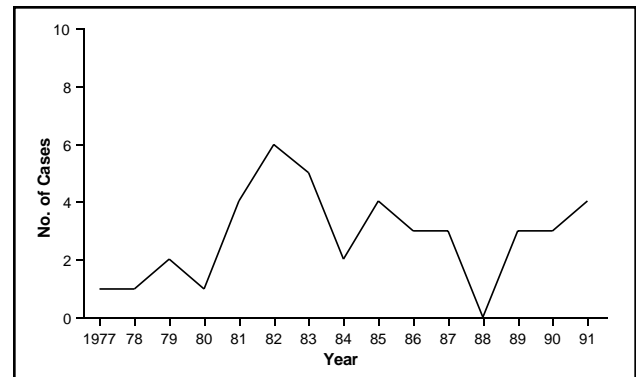


Figure 1. Leptospirosis cases by year, Missouri, 1977–91

## Lyme Disease

Lyme disease, caused by the spirochete *Borrelia burgdorferi*, was found in Old Lyme, Connecticut in 1975 to be transmitted by the *Ixodes scapularis* tick (formerly known in the east as *Ixodes dammini*). Subsequently, it has been found on the west coast where it is transmitted by the *Ixodes pacificus*. The illness often begins within 30 days of the tick bite with a characteristic skin lesion called erythema migrans (EM) which may be accompanied by generally mild systemic symptoms. Late arthritic, cardiac or neurologic manifestations may develop weeks after the initial tick exposure. The occurrence of Lyme disease in Missouri has been an enigma because the characteristic vector rarely bites humans in Missouri and the spirochete has not been definitively identified in the state. There have been numerous discoveries of spirochetes reacting with antibody tests in *Amblyomma* and *Dermacentor* ticks in Missouri, but all efforts to date to culture the bacteria have failed.

The number of Lyme disease cases reported increased dramatically after it was made reportable in Missouri in June 1989. See Figure 1. There were 205 cases reported in 1990 and 207 in 1991 which met the case criteria set by the Centers for Disease Prevention and Control (CDC) and the Council of State and Territorial Epidemiologists. These included 11 cases in 1990 and 7 in 1991 which were exposed outside of the state.

The highest incidence occurred in the 35–44 year age group in 1990 (6.5 per 100,000) and in the 45–54 year age group in 1991 (9.0 per 100,000). See Figure 2.

Seven counties located in the Southeastern health district were the location of most probable exposure for 15 or more cases in the two years combined and these counties accounted for 69.7 percent of the cases. See Figure 3. They included Bollinger, Cape Girardeau, Madison, Perry, Scott, Stoddard and Wayne counties.

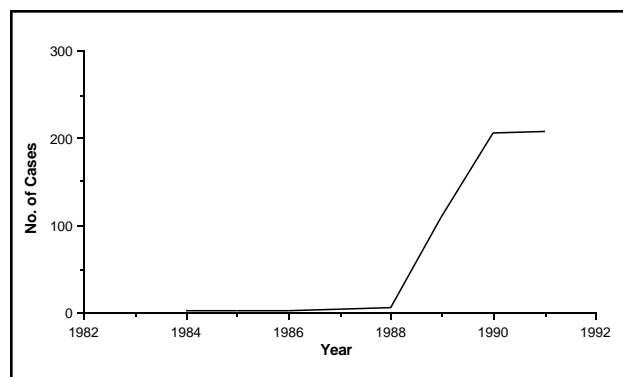


Figure 1. Lyme disease cases by year, Missouri, 1984–91

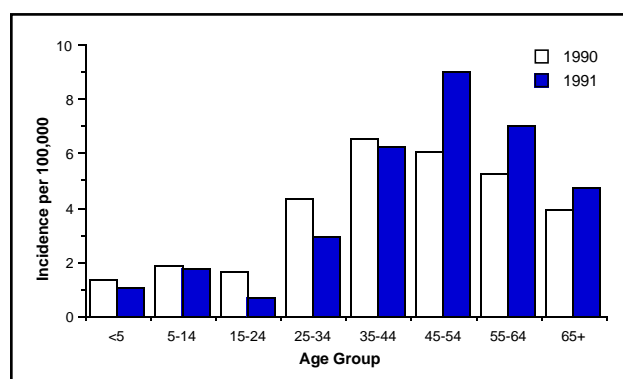


Figure 2. Lyme disease incidence by age group, Missouri, 1990–91

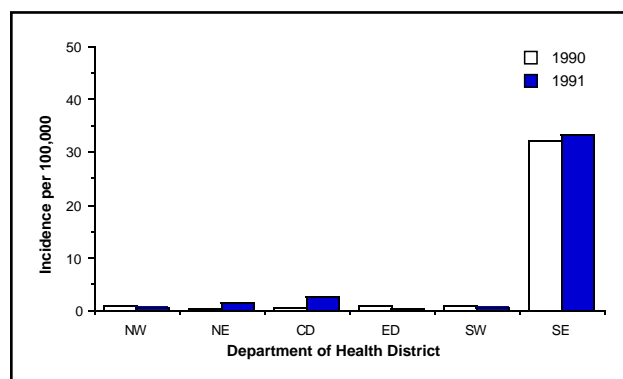


Figure 3. Lyme disease incidence by health district, Missouri, 1990–91

In June 1991, a field investigation of EM was done by Department of Health and CDC investigators. The case control study was conducted using the 45 cases who responded to a telephone survey. Controls were chosen using a random digit dialing system and were matched with cases by telephone prefix. Ages of the cases ranged from 3 to 84 years with a median of 37 years. Ages of the controls ranged from 4 to 84 years with a median of 40

years. There was a higher proportion of females among the controls than the cases. Onset of illness occurred from April to October for both 1990 and 1991. July was the most common month of onset in 1990 and May was most common in 1991.

Cases were more likely than controls to reside in a rural or less populated area, to live near a lake, and to hunt. There was no significant difference between cases and controls in frequency of tick attachment during the month preceding the case's illness.

## Psittacosis

Psittacosis is a chlamydial disease of birds and man resulting in respiratory tract manifestation. The disease is characterized by flu-like symptoms of fever, headache and myalgia which can progress to pneumonia. Transmission is by direct contact and inhalation of the organisms from an infected host.

With the increased popularity of birds as companion animals and the poor quarantine measures for psittacine birds entering the United States, the incidence of psittacosis is increasing.

Missouri experienced an epizootic of psittacosis in aviaries in 1988. Prompt action limited the infection to birds, avoiding human cases of disease. No cases of psittacosis were reported in 1990 and 1991. See Figure 1.

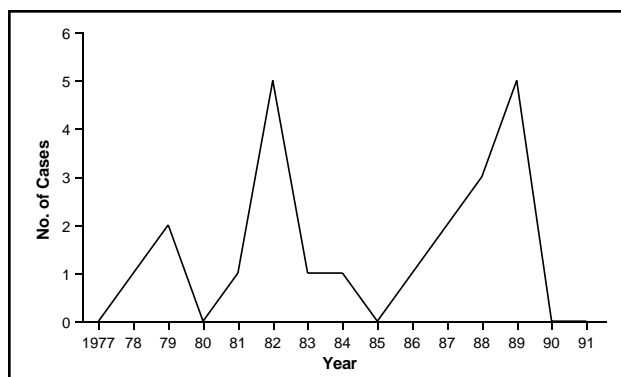


Figure 1. Psittacosis cases by year, Missouri, 1977-91



## Rabies

Rabies is a fatal viral disease due to a rhabdovirus of the genus *Lyssa-virus*. It is a neurogenic virus which results in acute encephalomyelitis in all warm-blooded mammal species. The onset is usually benign in nature with a sense of anxiety, headache, fever, malaise and sensory changes at the site of a previous animal bite. The disease progresses rapidly to paresis, paralysis and/or muscle spasms. Death is due to respiratory paralysis. Missouri had its last human rabies case in 1952.

An estimated 50,000 cases of human rabies occur annually in the world, mostly in developing nations. The United States has had one to two human rabies cases a year for the past decade, with a number of these resulting from exposure outside the continental United States. See Figure 1. The decreased number of human rabies cases in the developed nations of the world is attributed to the control of stray animals and the mandatory vaccination of dogs and cats to serve as a buffer zone between the wildlife reservoir of rabies and the human populace. All animal bites are evaluated for possible rabies exposure and an estimated 50,000 post-exposure rabies treatments are administered annually in the United States. A passive surveillance system is utilized to detect the prevalence of rabies in the animal populations.

Missouri experienced a total of 30 cases of animal rabies in 1990 and 28 cases in 1991. This is the lowest incidence of animal rabies recorded in Missouri since records have been maintained. The number of cases dropped below 50 per year in 1974 and 1988, with 41 and 36 respectively. See Figure 2. The distribution of the disease throughout the state confirms the fact that rabies is endemic in the entire state. Over the past decade, rabies has occurred in 93 of 115 Missouri counties.

The apparent low incidence of animal rabies can be attributed to two factors. A lengthy bus strike in

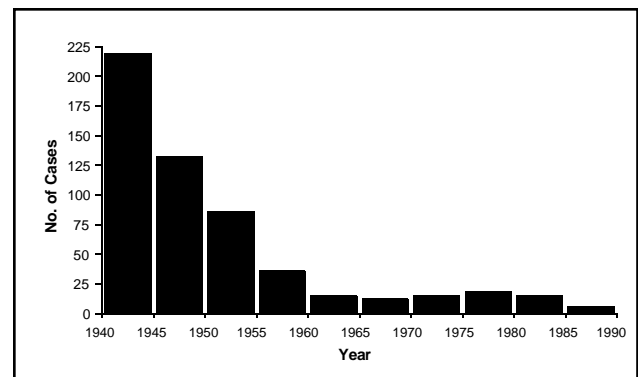


Figure 1. Human rabies cases by five-year intervals, United States, 1940-90

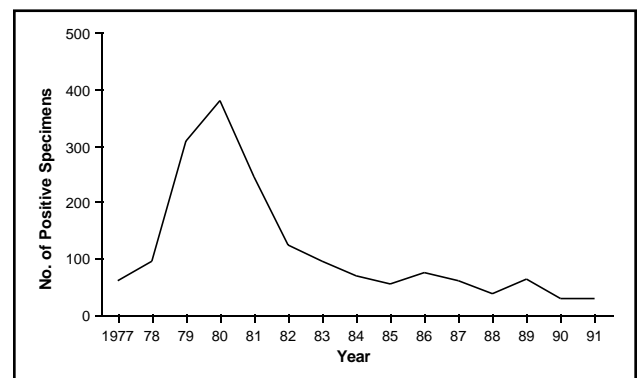


Figure 2. Positive animal rabies specimens by year, Missouri, 1977-91

1990 resulted in the termination of bus service to many outlying counties so that fewer specimens came in from areas that serve as the wildlife reservoir. The second and perhaps most important reason for the declining incidence of animal rabies is the decrease in the skunk population, the primary reservoir of rabies in Missouri. This has reduced the interaction and consequent spread of the disease, which is transmitted by the bite of an infected animal to a new host. The low incidence of skunk rabies has also decreased rabies in other animals normally exposed to this reservoir.

The Department of Health has a model rabies and animal control document that all individual counties have the authority to implement. Counties are encouraged to modify this basic document to meet their requirements. The document is comprehensive and covers all aspects of observation periods, proper vaccination of dogs and cats, general animal control and dangerous animal control.

## Rocky Mountain Spotted Fever (RMSF)

Rocky Mountain spotted fever (RMSF) is a rickettsial disease transmitted to man via the tick, *Dermacentor variabilis*, which is the reservoir for RMSF. Onset of the disease occurs 3–14 days after the infected tick has had a blood meal (engorged tick) on the susceptible individual. The organism is maintained in the midgut of the tick and is passed into the individual during the feeding process. It is also passed in tick fecal material and individuals can be infected by brushing the organism into abraded skin. Person to person transmission does not occur.

The disease is characterized by flu-like symptoms of fever, headache, malaise, myalgia and usually a maculopapular rash which appears on the palms and soles. The disease should be diagnosed by clinical signs and with either the CF or IFA test. The mortality rate can be as high as 15-20 percent in untreated cases. A four percent mortality is common.

Missouri has averaged 30-40 cases of RMSF per year during the last decade. In 1990, there were 36 cases and in 1991 there were 25 cases. See Figure 1.

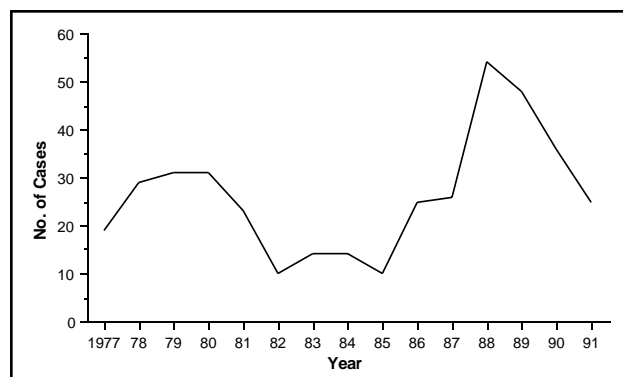


Figure 1. Rocky Mountain spotted fever cases by year, Missouri, 1977-91

## Tularemia

Tularemia is a bacterial disease of wildlife and man. Wild rabbits are the primary reservoir. It is transmitted to man primarily through the blood meal of an infected tick or by direct contact with the organism while skinning or cleaning an infected wild rabbit. Infection can occur from contact with the organism either in contaminated water or meat or from the mouth of an animal which has just consumed infected meat. The disease manifests itself with an indolent ulcer at the site of inoculation and regionally enlarged, painful lymph nodes. Other routes of infection produce specifically related signs and symptoms. The disease can progress to systemic and pulmonary manifestation with a case fatality rate of five to ten percent.

Missouri and the Ozark Plateau are endemic for tularemia. Missouri and Arkansas usually lead the nation in total number of cases. Missouri has averaged 50–60 cases a year during the last decade, with half the cases being transmitted from tick bites and half from contact with infected rabbits. In 1990, there were 33 cases and in 1991 there were 44 cases. See Figure 1.

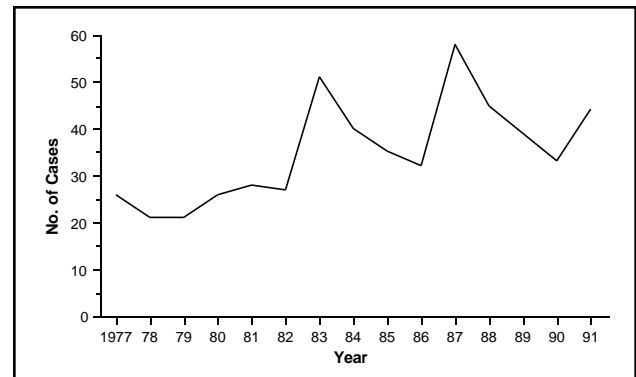


Figure 1. Tularemia cases by year, Missouri, 1977–91



## Other Reportable Diseases

<u>Disease</u>	<u>1990</u>	<u>1991</u>
Chickenpox	10,591	7,678
Fifth Disease	3,223	423
Pediculosis	12,616	9,129
Scabies	1,427	1,483
Scarlet Fever	797	740

Source: Data from active and passive surveillance systems



## Diseases of Low Incidence

<u>Disease</u>	<u>1990</u>	<u>1991</u>
Kawasaki Disease	11	13
Legionellosis	34	15
<i>Listeria monocytogenes</i>	21	10
Malaria	13	9
Tetanus	0	1
Toxic Shock Syndrome	12	12

There were no reported cases of anthrax, botulism, plague or trichinosis during these two years.